A PRIMER OF PSYCHOLOGY

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OF PSYCHOLOGY

BY

EDWARD BRADFORD TITCHENER

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To the Memory of

THOMAS HENRY HUXLEY

PREFACE TO SECOND EDITION

The text of this second edition has been thoroughly revised, and, I hope, considerably improved. Sections 23, 37, 85, 87, 92, and 111 have been modified or rewritten; several new exercises have been added; a large number of minor changes have been introduced in all the chapters; and, for the benefit of those who do not read German, a second Appendix, dealing with Flechsig's scheme of the cortical centres, has been inserted.

As regards the use of the book, I may quote from the Preface to the first edition: —

No experiment should be undertaken whose meaning the teacher does not thoroughly understand; none should be performed in class until he has thoroughly tested and familiarised himself with the instruments. So far as time allows, pupils should be encouraged to put their own apparatus together: to cut their own colour-discs, calculate their own pendulum-units, etc. They should also be instructed that the object of a psychological experiment is not to 'get things right,' to arrive at some prescribed result; but to get things as they are, to arrive at the truth. All idea of competition should be eliminated from the work. It will probably be found that Chapters VI., IX., and XIII. are somewhat more difficult than the rest; more time should therefore be allotted to their study. Sections 76 and 108 should be omitted if reaction-experiments cannot be carried out, and carried out in some detail. Sections 121 and 122, and the greater part of § 123, should be omitted from a high-school course. For the benefit of teachers who may desire to extend the brief account of the brain and nervous system given in § 6 and Appendix II., I have included brain models in the list of apparatus. It would be well to consult the Index (under *Physiology*) before determining the form which this extension shall assume. Throughout the book I have referred, where reference seemed useful, to Professor Huxley's *Elementary Lessons in Physiology* (reprint of 1897: The Macmillan Co.) and to Professor Nichols' *The Outlines of Physics* (1897: The Macmillan Co.). These works are cited as *H.* and *N.* respectively. A few citations of *F.* refer the reader to Professor Foster's *Text-book of Physiology* (single vol. ed., 1897: The Macmillan Co.). Answers to the 'Questions' appended to the chapters can always be worked out, if not from the text, from the 'References' that follow.

It is a very pleasant duty to acknowledge the assistance that I have received from Professor E. C. Sanford, of Clark University, and from Dr. I. M. Bentley, my colleague in the Sage School of Philosophy, in the preparation of the revised text. To both I am indebted for many points of valid criticism; to both I desire to express my sincere thanks for much self-sacrificing labour. I wish also to thank my wife, and my former pupil, Dr. E. B. Talbot, for numerous suggestions and corrections.

I have set the late Professor Huxley's name in the forefront of this second edition, partly as an act of homage to the Master in Science, — the brilliant investigator, the fearless critic, the lucid expositor;

but partly, also, as a personal tribute to one who showed himself a good friend and wise counsellor at a time when friendship and counsel were sorely needed.

CORNELL UNIVERSITY, ITHACA, N.Y.,
June, 1899.

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A PRIMER OF PSYCHOLOGY

CHAPTER I

Psychology: What it Is and What it Does

§ 1. **The Meaning of 'Psychology.'**—The word 'psychology' comes from the two Greek words *psyche*, 'mind,' and *logos*, 'word.' Psychology therefore means, by derivation, 'words' or 'talk about mind.' But it is understood among scientific men that when the word *logos* forms the last part of a compound English word it shall mean not simply 'talk about' a subject, but the *science* of that subject. Hence we sometimes speak of the sciences as the 'ologies.' Biology, for instance, which is derived from the Greek *bios*, 'life,' and *logos*, means the *science* of life; and oölogy, which comes from *oon*, 'egg,' and *logos*, is the *science* of birds' eggs. It would not be quite true to say, then, that psychology means 'talk about mind'; it rather means 'science of mind' or 'mental science.'

Psychology is the science of mind.

§ 2. **Science.** — But what is the difference between 'talk about' a thing and the 'science' of the thing? The sciences can all be put into words; they are written down in books, and courses of lectures are given upon them. After all, therefore, science is talk. *Is* there any real difference between them?

Science is complete and methodical knowledge.

The answer might be put in this way: all science is talk, but not all talk is science. Science is a particular kind of writing or talking. Talk may be random, scrappy, sketchy; we may talk about a thing when we do not know much about it, so that our talk deals only with one side of it or is patched out with guesswork; or we may talk only for a little time together, so that we do not at all exhaust the subject. Science, on the other hand, is orderly and methodical talk, talk that gives a complete and exhaustive account of the subject, talk in which no details are left out which can help us to explain the things talked about. Hence to say that psychology is the *science* of mind is very different from saying that it is simply talk about mind. We all talk about mind: we 'make up our mind,' or we 'have half a mind' to do something: but we are not all psychologists. The science of mind must give a complete account and an orderly, well-arranged account of its subject, keeping the facts steadily in view and never running off into mere speculation.

The science of biology.

Let us look for a moment at the two sciences mentioned just now: biology and oölogy. Biology is one of the largest and widest, oölogy one of the smallest of the sciences: but in calling each of them a science we mean precisely the same thing. Biology is an orderly and methodical account of life. It has to ask and answer definite questions: how life is distributed over the earth, what animals and plants are found in what places, and why; how life came to be so different in its forms as it now is, how species of plants and animals arose; how it is that our own life shows certain characteristics and peculiarities which we have inherited from our parents, as they did from their parents; etc. All these questions are approached carefully and worked upon by accurate methods; and the answers are all brought together and compared with each other. If they disagree, the questions are tried again: until at last the answers harmonise. When this is the case, when we have a complete account of life (complete, that is, so far as the facts are known) with no contradictions between one part of it and another, we have a 'system' of knowledge about life, or a 'science of biology.'

The science of oölogy.

So it is with oölogy. Every schoolboy can say something about birds' eggs. But the science of oölogy deals with them in an orderly and methodical way. It tries to find out the meaning of all the different colours and markings; it compares the shapes and sizes of eggs; it asks whether the colour of the place where the eggs are laid has anything to do with their colour, and whether the nature of the nest or rock or soil has anything to do with their shape. The oölogist knows at once, when he sees the eggs of the English robin and the American robin, that the birds must be quite different: the one is the egg of a Sylviine bird, the other that of a thrush (*Turdus*). His knowledge is arranged, systematic; not haphazard and scrappy. It is 'scientific.'

It should be said, perhaps, that science, as we have defined it, is rather the ideal of knowledge than its actual state As a matter of fact, none of the 'sciences' is a complete and perfectly harmonious system; new facts are constantly being discovered, and new explanations adopted. But the ideal which is aimed at, and which is slowly being realised, is that of the complete system. We may, therefore, rightly give the name of science to any body of knowledge which has been gained by scientific methods and is approximating to the scientific ideal.

The science of psychology.

That psychology really is a science, as it professes to be, is something that we must take for granted here. We cannot prove it until we have found out what psychology has to say about mind. Then, at the end of our enquiry, we shall be able to look back over what has been said, and see that psychology, so far as it has gone, makes up an orderly and systematic body of knowledge. We shall not, indeed, find that it is a finished science: there are yet many problems for the psychologist to solve. But we shall see that it is a science, in the sense in which biology and oölogy are sciences.

What is mind?

§ 3. **Mind.** — The subject that psychology treats of is *mind*. Plainly, then, it is the psychologist who can best answer the question what mind is. We, who are now beginning to study psychology, cannot be expected to know what mind is; we shall not know it till later on, when we have worked over the field of the science. Still, it would be unwise to begin to read without having any idea of what we are going to read about. It will be worth while, therefore, to try to find out in a general way what mind is, even if we cannot at present give a complete answer to the question. And we can find out most easily, perhaps, if we ask, first, what people say who are not psychologists, and then compare their answer with what the psychologist himself says.

The popular notion of mind.

If we ask someone who is not a psychologist, — someone, that is, who has not made a scientific study of mind, — what mind is, he will probably say this: "Mind is something inside of you which thinks and imagines and remembers. A stone does not know whether it is in one place or another; that is because it has no mind. A young oak sapling does not feel sorry when we cut down the parent oak: but we feel sorry when our parents die, because our minds can understand what death means. I have never been to Africa; but I can imagine what an African forest looks like, because my mind has imagination. Just as your body eats and drinks and walks and sleeps, so your mind thinks and feels and imagines and remembers. All these things that go on inside of you are done by your mind; they are the way in which your mind works." And then, if we press him further, and ask again what the mind really *is* that works in these ways, he will say: "We do not know much about that. We can only say that mind is not made up of matter, as the body is; it is immaterial. It lives inside the body, but does not take up any space: just as a room is full of air, but you can walk through it without knowing that it is not empty. Very possibly it has the same shape as the body, like a sort of ghost. But we do not know much about it; we only know its workings."

Now there is a part of this answer that the psychologist will be quite ready to accept; but there is a part of it which he will say is wrong. That is not surprising; we should not expect a man who had not made a scientific study of a subject to be able to give a description of it that would satisfy others who had done so. Let us see, then, what is right in the answer and what is wrong.

Really, mind *is*, not *has*, thoughts and feelings;

It is true that thoughts and memories and imaginations and feelings are parts of mind. It is true, too, in a sense, that they 'go on inside of' us. But the psychologist does not think it true that they are 'done by' the mind or are the 'workings' of the mind, — that the mind is something separate from them. He believes that they *are* the mind; that the mind is just the sum of them all: so that when he says 'mind' he is simply using a sort of shorthand phrase for 'all my thoughts and feelings.'

as the chair *is*, not *has*, seat and back, etc.

It is a little difficult at first to understand this use of the word 'mind'; but it is important that the use should be understood. To make it clearer we will take an illustration. Suppose we were asked to describe a chair. We might say: "A chair is a piece of furniture that has a seat, and four legs, and bars, and a back, and sometimes arms and rockers." That seems true enough. But if we look at the description closely we find a difficulty. Does the chair 'have' these parts? Is there any chair there if you take the legs and back and seat and arms away? It is more nearly true to say that the chair *is* all these things than that it *has* them. When we speak of the 'legs of a chair,' we do not mean that the chair is complete without its legs; we ought really to say 'the legs of the rest of a chair' or 'the legs of back and seat and arms.' Now it is precisely the same with mind. We must not say that the mind 'has' thoughts and feelings; but that the mind *is* thoughts and feelings. Take away the thoughts and feelings and you take away the mind.

Fallacy in parallel. there is nothing [illegible] example a mind is not like a chair. Thoughts + feelings depend on the [illegible]

"But we are constantly losing thoughts; we forget things. Yet the mind remains." So may the chair-seat lose straws or bits of cloth or parts of its hair-padding; yet the chair remains. And the mind is renewed as the chair is; we learn new things, to make up for what we have forgotten. Take away a great group of thoughts, and the mind is an 'insane' mind, a fragment that is of little use, — like the chair without its legs. Take away thoughts and feelings altogether, and you take away the whole mind.

§ 4. **Thing and Process.** — Mind, then, is the sum of thoughts, feelings, etc. They are the material, the stuff, so to speak, of which mind is made; and they are accordingly the matters with which psychology deals.

Things and processes.

The objects of which science treats are of two different kinds. They may be *things*, or they may be *processes*. If we were arranging fossil specimens or

[illegible] things [illegible] yet named shells or minerals, or if we were experimenting in the physical laboratory with the wedge and the inclined plane and falling bodies, we should be handling *things*. Things are, for all practical purposes, lasting and unchanging; they *are* there, on the table before us, and they do not alter as we look at them. On the other hand, if we were watching the course of a chemical change as it occurred in the test-tube, or observing the growth of a tadpole into a frog, we should be dealing with *processes*. Processes are always changing; they are different now from what they were a moment ago and from what they will be a moment later; they *go on* there, in the test-tube or the aquarium before us. — Psychology is a science that treats exclusively of matters of the second sort, *i.e.*, of processes. In psychology we observe events, occurrences, happenings, goings on, processes: never things. There is no part of mind, no thought or feeling or memory or imagination, that we can catch at rest and watch unchanged; thought and feeling are changing, moving, shifting from instant to instant. Mind, then, as the sum of thoughts and feelings and the rest, is a sum of processes. The objects of the 'science of mind' are the processes of mind; the objects of 'mental science' are mental processes.

Mind is a sum of processes.

To be able to convince oneself of the fact that the objects of psychology are always processes, one must have had some amount of training and practice in psychological observation. But a rough experiment here will be of some assistance.

The idea of a chair.

(1) As you sit reading, shut your eyes and try to think steadily of the *chair* in which you sit. You will probably have, at first, a memory of the printed word 'chair' which

you have just read. This you will see in the 'mind's eye.' Perhaps, too, you will hear the word 'chair' spoken in the mind's ear. Then will come a somewhat vague and shadowy picture of the chair, as it looks when your eyes are open, only that it will very likely seem to be inside your head, — as if you turned your eyes inward to see it. All this occurs with great rapidity, the changes coming in less time than it takes to write them down. Now try to hold the idea steadily. Your mind will suddenly 'become a blank'; then the idea will crop up again, not just as it was at first, but with some part of the picture more prominent than the rest, or with some new picture of another chair blended in with it; then comes the blank again; and so on. Now look at the blank for a moment: you will find that it was not really *nothing*, no mind at all, but that it was made up of the black field before your eyes, of the pressure from your chair as you sat, of the sensations set up by the movements of the chest and abdomen in breathing, etc. And the various processes in the blank shift and change as inevitably as the processes in the idea of the chair. Here, then, is a flow, a passage, a going on: not anything like a 'thing.'

The perception of a table.

(2) Close the book and look steadily at the table in front of you, and try to think continuously of that. You will find that steadiness now is even more impossible than it was when the eyes were shut. There is a tendency to let the eyes wander, to let them follow the grain and pattern of the wood, or to travel over the various objects lying on the table. If you withstand this temptation, your mind becomes a blank very soon indeed: the table gets to be quite meaningless to you. Presently the blank ends: you remember that you 'ought' to have thought of the table, and resolve to do so; the eyes try to wander again; and so the whole history is repeated. Now look at the blank: it is filled up with pressures from your chair, sensations from breathing, sensations of strain about the eyes, etc. Here too, therefore, there is a flow of processes; the picture of the table, the feeling of 'ought,' the resolve, the pressure, the strain, all these are

the mind does not 'merely go on'

mental processes; they are, or they make up, your mind during the experiment. Mind 'goes on' from moment to moment; it is never still.

§ 5. **Mental Process.** — We must now ask how it is that a *mental* process differs from the other processes that we have mentioned. If the mental process were in all respects the same as the chemical and the biological process, we should not be able to put the three into three different sciences: chemical decomposition, and the growth of the frog, and the course of an idea would all have to be treated by some one science. What, then, does the word 'mental' mean?

Mental processes go on inside the body,

We said just now that mental processes go on 'inside of us.' The process in the test-tube and the process in the aquarium are, clearly, going on outside of us. Here, then, is one difference between the mental and the other processes. Still, it does not take us very far. For there are chemical processes also going on inside of us: processes of digestion, *e.g.* And biological processes of growth and decay are also going on inside of us; yet we do not speak of them as mental. The difference cannot, therefore, be merely a difference of inside and outside.

What we have to do is to distinguish somehow between the inside processes which are mental and the inside processes which are not mental. We had a similar task in § 2: all science is talk, we found, but not all talk is science. So here: all mental processes are processes going on inside the body, but not all inside processes are mental. What is the difference between them? The characteristics that made talk into science were those of method and completeness. What are the characteristics that make a process within the body a mental process? This is a question that has been answered in a great many ways. The simplest answer to it, perhaps, is this. A mental process is a process which can form part of the experience of one person only; the processes dealt with by other sciences can form part of everybody's experience. Not only does the mental process go on inside of you; it is so entirely inside of you that you are the only person who can ever get at it and observe it.

and can be known by one person only

Illustrations will help us again. And as we have settled the point that psychology deals always with processes, and always too with processes within the body, we will take two of these processes as our illustrations.

(which is not true of other processes);

We said that the process of digestion, going on inside the living body, is a chemical process. Under ordinary circumstances, no one, neither yourself nor anyone else, can watch your digestive processes. But cases are known in which the wall of the stomach has been torn through, say, by a gunshot wound; so that digestion could be followed by the eye, just as the reaction in a test-tube can be followed. Now it is plain that, in such a case, other people could trace the process as well as you could: better, indeed, for you could watch your own digestion only by means of a mirror, whereas the onlooker could watch it directly. The mental processes, on the other hand, — the pain of the wound, the feelings of hunger and of satiety, — form part of your experience only; they can never enter into the experience of the onlooker.

The same thing holds of the process of growth. The growth of a bone or of a tumour within the body could be followed from day to day by means of x-ray photographs. But this growth would evidently lie open to your physician, or to anyone else to whom he should show the photographs, just as well as to yourself. The mental processes, the pains and pressures coming from the growth, would be yours and yours only.

We can put this answer in a different way: in a sentence which, at first sight, seems to contradict what we have just said, but which really throws light on it. We may say that every object dealt with by any science whatsoever, — whether it be thing or process, whether it be inside of the body or outside, — can be transformed into a mental process. For everything can be looked at in two ways. It can be looked at as it is in the world, where one man can see it as well as his neighbour: or it can be looked at as it is in someone's personal experience. Looked at in the first way it is a physical thing or a chemical process or a physiological process or what not; looked at in the second way it is always a mental process.

but they embrace the whole world.

Think of *sound*, for instance. The physicist says that sound is a certain kind of movement of the particles of the air we breathe. The physiologist says that sound is a commotion in the cells of a certain part of the brain, — a commotion first set up by the action of the air particles on the ear, and then carried inwards to the brain along the nerve of hearing. The psychologist says that sound is a sensation, a mental process.

The three sounds seem to be very different. The air movements go on quite independently of us; there is physical sound when the air moves, whether we are present to hear it or not. And the commotion in our brain goes on quite independently of us: the physiologist who has made models of the ear and performed experiments on animals tells us what happens, and we believe him; but we do not know more than anyone else about the processes in our ear and brain. But the hearing, the sensation of rap or thud or

The three sounds: physical, physiological, psychological.

tone, is a particular experience: everyone hears for himself, and no one can have any sensation but his own. This last sound, therefore, is a mental process.

Nevertheless, we can make the physical and the physiological sounds into mental processes. For after all, if we are to have a science of physics, we must have an *idea* of the physical movements; physics is simply a statement of the ideas of people who have worked at physical problems. Hence we can say, "Sound is a certain movement of the air-particles": that is physics. But we can also say, "This or this is my *idea* of the movement of the air-particles": and that is psychology. And similarly with the brain commotion.

To make the point quite clear, go to a physical text-book (*N.*, 337) and read the definition of sound there given. Then ask yourself what idea this definition calls up. Your idea will perhaps be made up, in part, of mental pictures of the words of the definition (*cf.* above, p. 7); but you will also see, probably, in the mind's eye, some picture of the actual movement. Observe this picture carefully, and try to describe it in words. Compare your own idea with those of two or three of your friends. You will find at once how individual it is, how entirely it is your own experience and not that of anybody else. Even if the words in which two of you describe it should, by some accident, be identical, — and this may happen quite easily when you are not used to psychological observation, — each will still feel certain of the fact that the picture described is *his* picture and his only; it cannot be transferred from the one to the other, or handed round for inspection. You will find, that is, that the physical sound has become an idea of physical sound, a mental process.

In this way anything and everything can be made into a mental process. Just now we saw that a *chair* — which, if we look at it as a physical object, is sufficiently solid and unchanging — becomes a process, or rather a group of processes, when we look at it psychologically, *i.e.*, look at our idea of it. It would be worth the reader's while to test some other cases: try heat, *e.g.*, or light, or animal, or rock. The result will be precisely the same.

The brain is the organ of mind.

§ 6. **Mind and Body.** — Mental processes run their course 'within' — better, in connection with — the living body. But they are more closely connected with some parts of the body than with others. Mental processes appear only when there is a commotion (or, as it is technically called, an *excitation*) in a certain portion of the brain. Hence the brain is sometimes spoken of as the 'organ of mind.'

The brain (*H.*, 290) is a rounded whitish mass of soft tissue lying in the cavity of the skull. It is made up of nerve *fibres* (delicate strings of tissue; *H.*, 356) and of nerve *cells* (*H.*, 359). The cells are found in groups or clusters within the brain mass, and also form a layer or rind covering the whole. This layer is called the *cortex* (bark or rind). It is only when certain cells of the cortex are excited that we have a mental process; the fibres serve simply to join groups of cells together, and so to convey excitations from one part of the brain to another.

The nervous system.

Nerve fibres (*H.*, 201, 278, 295) are found not only in the brain itself, however, but also throughout the body. Nerves run into the brain from every organ of the body: from eyes, nose, skin, heart, muscles, bones, etc. And nerves run out from the brain to the muscles. In both cases the nerve fibres act merely as telegraph wires, carrying messages from cells in the bodily organs to cells in the brain, and from brain-cells out again to muscle-cells.

Physiological and psychological processes.

Suppose, *e.g.*, that as you are reading a fly settles on your forehead, and you raise your hand to drive it away. On the physiological side you have the following processes. (1) The weight and movement of the fly act as 'stimulus' to certain skin-cells from which nerves run inwards to the brain. 'Stimulus' is the technical word for the physical object or process that can excite a sense-organ and so give rise to a mental process. (2) The stimulation of these skin-cells sends an 'excitation' travelling along the nerves. (3) The excitation arrives at a group of cortical brain-cells, and explodes them. (4) A new excitation, due to the explosion, travels along fibres running within the cortex to another group of cells, from which nerves run to the muscles of hand and arm, and (5) explodes these. Their explosion (6) sends the necessary excitation to hand and arm: hand and arm move. (7) This movement serves as 'stimulus' to muscle-cells, from which yet other nerves run inwards to the brain. (8) The stimulation of these muscle-cells sends an excitation travelling along this second set of in-going nerves. (9) The excitation arrives at a group of cortical cells, and explodes them; stage (3) is repeated, but at a different part of the cortex.

On the psychological side you have: at stage (3) an idea of the fly, and at stage (9) sensations which tell you of the position and movement of your hand and arm. No mental process is present at any of the other stages; not even at stage (5). It is only when the cortical cells which *receive* the *incoming* excitations are exploded that a mental process arises. (*F.*, 1060.)

How we know the relation of brain to mind.

The fact that the brain is the organ of mind has been established by two lines of evidence. In the first place, we find all through the animal kingdom that size and complexity of brain are matched by range and complexity of mental processes. And, secondly, we find that disturbance of certain parts of the brain indicates a certain form of mental disturbance, and conversely, that particular forms of mental disturbance indicate disturbance of particular parts of the brain.

We cannot go into the details of this evidence here. The following facts, however, may be noted.

(1) The brain of man is, by absolute measurement, an organ of great size; it is heavier than that of any other animal, with the exception of a few of the very largest (elephant, etc.). It is also relatively, *i.e.*, when compared with the weight of the whole body, heavier than the brain of any other animal, with the exception of a few of the most highly developed small mammals (some monkeys, etc.). And we know that the mental life of man is richer than that of any other animal. (Donaldson, *Growth of Brain*, 121.)

(2) The physician finds from experience that peculiar disorders of a patient's *ideas*, as shown, *e.g.*, by forgetfulness of the names of a certain class of things, indicate disorder of a special part of the cortex, — say, the pressure of a blood-clot upon a particular area of the nervous substance. Hence the mental symptoms justify his opening the skull at a certain place. He finds the clot, and removes it; and with its removal the patient's ideas become normal again. (*Cf.* § 115.)

How do we know that other people have minds?

But how do we know anything about the 'range and complexity of mental processes all through the animal kingdom'? How do we know, for that matter, — since we can know only our own mental processes, — that anyone except ourselves has a mind at all?

Before we attempt to answer this question, let us be quite sure as to what the question is. We can never *know* any mental processes but our own; we cannot experience our neighbour's experiences. No one can take his friend's grief out of his friend's mind, and put it into his own. But we can know *about* the minds of others, because we can form ideas of their minds. "I know just how he felt when he got that letter!" we say: or "I knew that he would think as I did about it." In other words: it is quite possible to know *that* other people have minds, although it is impossible to experience what they experience, to make their mental processes our mental processes. How do we know, then, that other men, and the animals, have minds?

The argument from society.

In the first place, there can be no doubt of the matter as regards other men. The whole of our common life — family life, social life, civic life, national life — is based upon the assumption that we all have minds, and would be impossible if the assumption were falsified by the facts. All these forms of life, that is, are the productions of more than one mind. All of them, *e.g.*, presuppose *language.* And language is a mental product that requires at least two minds for its making. We should never have made words to talk to ourselves. All of them, again, presuppose *laws.* Now a single mind may form a habit; but it takes at least two minds to make a law.

The argument from actions.

But, secondly, there is other evidence, which leads us to assert that all the animals, and not men only, possess minds. This is evidence drawn from conduct or behaviour. Our conduct indicates the state of our mind, the character of our mental processes, at a given moment, just as the direction in which the weather-cock points indicates the direction of the wind. If we find, then, that certain outside circumstances set up certain mental processes in us, and that under these same circumstances we act in a certain way: and if we find that under similar outside circumstances an animal acts in a similar way: then we are justified in concluding that the animal has similar mental processes. Thus there can be no doubt that a dog feels grief and anger, recognises his master, dreams in his sleep, etc.; under fitting circumstances he 'shows all the signs' of feeling and recognising and dreaming.

Rudimentary minds.

It is not surprising, perhaps, that we should find signs of mind in the higher animals; animals whose nervous system is built on precisely the same pattern as our own. But we find them quite plainly, too, in the conduct of animals whose structure is very different from ours, *e.g.*, in that of insects. More than that: we find them persisting in the conduct of the very lowest animals that there are, the one-celled animals whose movements cannot be followed except by help of the microscope. These creatures show signs of rudimentary 'impulsive' action (p. 176, *inf.*). At the same time, while we grant that they have minds, we must guard against supposing that the mental processes whose signs we see in their actions are at all like our own. Mental processes grow more and more distinct as the nervous system grows distinct from the rest of the body; and animals that are 'all of a piece' — any part of whose body can act as nerve or muscle or stomach or lung — cannot have any but the most confused and vague mental processes.

It has been seriously argued by some psychologists that mind appears wherever life appears; not only in the animal kingdom, but in the vegetable as well. This is a question which we cannot stop to discuss here. At any rate the plant-mind, if there is such a thing, must be so extraordinarily rudimentary and so totally different from our own that it is hopeless to try to form any idea of it.

Mind is not a function of brain;

§ 7. **Psychology and Physiology**. — It has sometimes been said, on the ground of the facts stated in the foregoing Section, that psychology is nothing but a branch of physiology. Just as the lachrymal glands secrete tears, it is urged, or the sweat-glands in the skin secrete sweat, or the liver secretes bile, just so does the brain secrete mental processes, thoughts and feelings. As it is the function or office of the stomach to digest food, so it is the function of the brain to think and feel.

This argument is not sound. It is important that the psychologist should understand physiology, and especially the physiology of the nervous system;

but psychology is not a part of physiology. The reason why the psychologist is interested in the body is this.

but body is the condition of mind.

In every science we try to *explain* things. Facts cannot be methodically arranged and harmonised until they are explained. Now to explain a thing is simply to *state the circumstances under which it appears*. These circumstances are termed the *conditions* of the thing's appearance. Apply this to psychology. Certain disturbances in the body, beginning in a bodily organ and ending in the cortex, are the circumstances under which mental processes appear. Bodily processes, that is, are the conditions of mental processes; and the statement of them furnishes us with the scientific explanation of the mental processes. We can deal with mental processes by themselves; but to make our psychology complete we should add to our account of mind an explanation of it, that is, an account of its bodily conditions.

The principle of parallelism.

That is why the psychologist ought to know physiology. Wherever a mental process occurs, there must be a bodily process to serve as its condition. But this is not saying that the brain *produces* mental processes: it is merely saying that the mental *runs alongside of* the bodily, — that, as a matter of fact, the bodily is the condition of the mental. To say more than this is to leave science for ungrounded speculation.

It is important to understand clearly what scientific explanation means. Hence it will be well for the reader to test the definition just given by instances taken from various sciences: to see, *e.g.*, how the physicist explains the formation of dew, or the geologist the appearance of different kinds of rocks.

It may seem strange at first sight that an occurrence in one science (physiology) should be called upon to explain an occurrence in another (psychology). But the process of digestion (physiological) is chemically explained; the shape of the bones of the skeleton (anatomical) is physically explained (by the law of the lever, etc.); and so on.

§ 8. **The Divisions of Mind.** — When the zoölogist sets to work to classify animals, his material, what he has before him to work with, is simply the separate individual animals found in the world. By putting together the creatures that are more or less alike, he is able to make an orderly arrangement of his material: he groups the separate animals into grades and orders and families and genera and species. **Classification.**

So it is with the psychologist. Mind is a stream of processes, going on as long as the body goes on living. The psychologist disentangles these processes, and puts together into groups those that are more or less alike. In this way he is able to classify his material; he passes by stages from the total mind to the single processes of which mind is composed.

The total mind, the mind that extends over the whole lifetime, falls (1) into three parts. We call them the *child* mind, the *adult* mind and the *senile* mind. Each part has well-marked peculiarities which distinguish it from the others, although we cannot say precisely in what years of life the first two give place to their successors. The change is gradual, and occurs at different times in different lives. (2) Each of these part-minds consists of a series of consciousnesses. By *consciousness* we mean 'mind **The three parts of mind.** **Consciousness.**

now'; the mind of the present moment. It is clear that, as you pass through life, you pass through a succession of 'now's': *now* it is time to get up, *now* time for breakfast, *now* time for work, and so on. The mind at every 'now,' whether it be in childhood or in manhood or in old age, is a consciousness. You have a getting-up consciousness, a breakfast consciousness, etc. Sometimes consciousnesses pass into one another by slow degrees, and sometimes very suddenly.

States of consciousness.

But a group of animals may live under favourable or unfavourable conditions: there may be enough or too little rain for them, scarcity of food or abundance of food, etc. The conditions of consciousness may vary in the same way; the brain may be well-nourished or ill-nourished, etc. So we have different *states* of consciousness, as they are called. Besides the normal, *waking* consciousness, we have abnormal states of consciousness, the chief of which are seen in the *dreaming* and the *hypnotic* consciousnesses. Within the waking consciousness we have a well-marked difference between the *attentive* state, the state in which we are fully absorbed or interested in something, and the state of inattention.

Remember that, just as the same animals may live under different conditions, and be fat or lean, healthy or unhealthy, so the same consciousnesses may appear in different states. That is, the mental processes may be the same in attention that they are in inattention; it is only their *state* that differs, — their clearness and definiteness, and (if we may say so) their power to hold their own against other processes.

So we may see an accident or dream of it. In the first case it has a great hold over us; in the second we forget it soon after waking. The *state* of the accident-processes differs in the two consciousnesses.

The concrete process.

(3) Every consciousness is made up of a number of *concrete processes:* ideas, feelings, wishes, resolu-

tions, etc. Each of these, every idea or resolve or feeling that forms part of our conscious experience, is a *specific item* of that experience, — corresponding to the separate animal, horse or eagle or what not, of the zoölogist.

(4) Once more: just as histological observation shows that the animal is not made up of a single uniform substance, but that the organism is composed of a number of different tissues, so does psychological observation show that no concrete mental process, no idea or feeling that we actually experience as part of a consciousness, is a simple process, but that all alike are made up of a number of really simple processes blended together. These simple processes are called *mental elements*. They are very numerous: there are probably some 50,000 of them: but they may all be grouped into two great classes, as *sensations* and *affections*.

The mental elements.

Reversing our order, then, we may build up mind as follows. We set out with the two classes of elementary processes, sensations (red, cold, bitter) and affections (pleasant, unpleasant). *These can never be experienced separately:* a consciousness is never a single elementary process, but always a *group* of *concrete* processes. While the chemist can get H and O as well as H_2O, the elements as well as the compound, the psychologist can never know sensations and affections except by abstraction, by directing his attention upon one part of a concrete process and ignoring the rest of it.

The upbuilding of mind.

Above the elements stand the simplest forms of *real* mental experience, the concrete processes (ideas, feelings, etc.). These unite, again, to form consciousnesses, which appear in various states, according as their bodily conditions vary. Finally, a certain series of consciousnesses makes up a child or adult or senile mind; and these three part-minds, taken together, make up the whole mind of the individual man.

§ 9. **The Problem of Psychology.** — We are now in a position to say just what the problem is that the psychologist is called upon to solve. He must (1) give an exact account of the *elementary processes*, of sensation and affection. He must then (2) state the *laws* which govern the connection of the elements into concrete processes, and the connection of concrete processes into consciousnesses. He must also declare whether these laws hold alike of the child, adult and senile mind, and of the animal mind as well as of the human, or whether there are different laws for each stage of mental development. Lastly, (3) he must give the bodily conditions under which the elementary processes appear, and those under which a change occurs in the state of consciousness.

Elements.

Laws of connection.

Bodily conditions.

This threefold problem is a great deal too wide to be solved in a single book. All that we can do here is to sketch briefly the answers to the most important questions involved. But it is well to realise, at the beginning of one's study of mind, how large and how varied a field psychology covers.

Additional Questions and Exercises

(1) In thinking of the chair as directed in § 4 do you see it in your head, or do you see yourself sitting in it, or is it somewhere in space, away from you? If you see it in space, where precisely does it seem to be? Can you make it move from place to place at will? Can you see it on your eyelids? Can you see it as if it were in the room behind you?

(2) When you are thinking of the table, and have the *feeling of 'ought'* and the *resolve* to hold the table steadily, what are the processes that actually make up your consciousness? Can

you split up the feeling and the resolve into simpler processes? Think of various things that you ought and mean to do, and see if you can discover what the feelings and resolves are made up of.

(3) What difference would it make in the list of processes, psychological and physiological, in § 6, if instead of simply waving my hand to drive the fly away I actually touched my forehead? Draw a diagram (pattern in James, *Textbook*, p. 117).

(4) What other products of our common life are there, besides language and law, which compel us to believe that our fellow-men have minds?

(5) How would a dog show grief, anger, recognition, dreaming? How could you tell that a one-celled animal was moving 'impulsively'?

(6) Give from memory some of the differences between your mind as a young child and your mind now. How do old people's minds differ from your own?

(7) Write out a list of the chief consciousnesses that have made up your experience to-day. How short a time do you think a consciousness could last? And how long a time? Give an instance of a sudden change from one consciousness to another of quite a different kind.

(8) What is the physiological function of the brain? If it is the function of the stomach to digest, and that of the liver to secrete bile, the brain must have a similar office, as a bodily organ. That office is *not* to secrete thought and feeling: what is it? (*H.*, 18; *F.*, 7.)

(9) What is your earliest notion of your own mind that you can recall?

(10) State definitely what assistance a physiologist would derive from a knowledge of psychology.

(11) What is meant by the 'explosion' of a nerve-cell? (*H.*, 287; *F.*, 145; H. H. Donaldson, *The Growth of the Brain*, 1895, p. 277.) And what by 'cerebral localisation'? (*F.*, pp. 740 ff.; P. Flechsig, *Gehirn u. Seele*, 1896; *Localisation d. geistigen Vorgänge*, 1896.)

References for Further Reading

James, *Textbook of Psychology*, pp. 1–8, 78–120, 128–133, 151–160.
Sully, *The Human Mind*, vol. I., chs. i., iii.; vol. II., appendix N.
Titchener, *Outline of Psychology*, §§ 1–6, 100.
Wundt, *Lectures on Human and Animal Psychology*, Lecture I., §§ 1, 2; Lecture XXX., §§ 2, 3, 4.
Wundt, *Outlines of Psychology*, §§ 1, 2, 4, 22.

CHAPTER II

THE METHOD OF PSYCHOLOGY

§ 10. **Observation.** — The first thing which science demands of you is that you learn to observe. Observation, the seeing of things or processes as they really are, is by no means easy. "There is not one person in a hundred," says Huxley, "who can describe the commonest occurrence with even an approach to accuracy."

The difficulties of observing

There are four reasons why observation should be difficult. (1) In the first place, we are all naturally careless; we like to take things easily, and dislike making a sustained effort. Observation requires great care. (2) Secondly, we are all biassed or prejudiced. Thus we may expect to see a certain thing, or want to see a certain thing. Under these circumstances, there is every chance of our seeing that thing when it is not there to see. (3) Thirdly, it is not till we have had a good deal of practice in observation that we know what to look for; in our first attempts we are 'all at sea,' — just as likely to make much of the unimportant as to single out the important things. (4) And lastly, when the object of observation is a process, something that continually changes, we may be confused and baffled by the change. If the process goes on slowly, we may grow tired of observing, and so overlook some of its stages; if it goes on quickly, we may not have time to notice them all.

(1) and (2) are well illustrated by the game of 'hunt-the-thimble.' The thimble is least likely to be found if you put it out in full view upon a central table. This is because the seeker is too careless to note so small an addition to the familiar things already on the table, and because he is prejudiced by the idea that you must have hidden the thimble in some very 'unlikely' place.

(3) is illustrated by the difficulty that we all have of making our companion on a country walk see a bird that has just settled on a tree a little way off. When he has found it, when he knows what he should have looked for, he is surprised that he did not see it at once.

(4) may be psychologically illustrated. Go into a darkened room, and look straight in front of you. You will see the blackness dotted and sprinkled with all manner of coloured points and flashes and patterns, which pass into one another like 'dissolving views.' Try to follow the changes, describing them aloud to yourself.

and how to overcome them.

These difficulties may all of them be overcome, however, with patience and practice. The reader who has worked in a physical or chemical laboratory will remember how 'hopelessly accurate' physical measurements and chemical analyses seemed at first, but how in time it became as natural for him to be careful as it had been to be careless. If a man "keep faithfully busy each hour of the working day," says Professor James, "he may safely leave the final result to itself. He can with perfect certainty count on waking up some fine morning, to find himself one of the competent ones of his generation, in whatever pursuit he may have singled out." And the scientific man would not know so well what his difficulties were, if he had not been able to surmount them.

What an 'experiment' is.

§ 11. **Experiment.** — Wherever it is possible, science employs experiment in its observations. An experiment is simply an observation made under standard conditions. When an event happens in nature, it happens under all sorts of conditions, some of which are its conditions (the circumstances under which it occurs), while others are of no importance for it, but are present accidentally, as it were,— merely because nature is so enormously complicated. In order to sift out the true conditions from their chance accompaniments we perform experiments. We arrange the conditions under which the event shall occur, in such a way (1) that other investigators can *repeat* our observation, and (2) that they and we can *vary* one condition after another, and see how the event is affected by the change. Hence an experiment is both an observation that can be repeated, and an observation that can be explained. These two properties of the experiment are indicated by the words 'standard conditions.'

In many cases an experiment enables us to reproduce and explain an event that in nature requires long ages for its accomplishment. Thus the geologist finds that certain rocks have been smoothed or hollowed, to all appearances, by the action of sand driven against their surface by the wind. Taking a piece of rock to his laboratory, and driving sand against it at high pressure by the 'sand blast,' he is able to satisfy himself that the wind and sand could produce the observed effects.

So the formation of shores and of river beds, which in nature is an exceedingly slow process, can be shown in a few minutes experimentally, by pouring a stream of water upon a mixture of different kinds of earth.

§ 12. **Psychological Observation.** — Psychological observation has all the difficulties of scientific observation in general, and some added difficulties of its own. Our mental processes are so familiar to us, we think we know ourselves so well, that we are liable to be very careless and very prejudiced in our account of our own mind. Again, even if we take the psychologist's warning to heart, and resolve to look at ourselves carefully and impartially, we are at a loss to know what to look for: what we have always taken most for granted may be altogether imaginary, and quite unlike the reality. And lastly, of all the processes that we could set out to examine, mental processes are the least tangible and the most elusive.

The difficulties of psychological observation

Moreover, psychological observation is observation by each man of his own experience, of mental processes which lie open to him but to no one else. Hence while all other scientific observation may be called *inspection*, the looking *at* things or processes, psychological observation is *introspection*, the looking *inward* into oneself. Now 'observing' is a mental process. When we are observing a thing or process in the outside world, we do not thereby interfere with it: the fossils are there, and the tadpole goes on growing, whether or not we have turned them into mental processes, formed ideas of them. But when we are observing a mental process the case is very different. We are now interfering with what we are watching: our consciousness a moment ago, before we began to introspect, was made up of certain processes; now we have introduced among these

or introspection

a new process, — the mental process of observation. Surely, that is a poor method of observation which changes the very thing that we want to observe!

and their removal.

To get over this difficulty, you must wait to introspect until the processes that you wish to examine have passed by. Let them run their course undisturbed: then call them back by memory, and look at them. They are now dead, and cannot be changed by your observation. Only take care that you do not wait too long before recalling them If a *post mortem* examination is to be of any use, it must be made soon after death. And decay sets in among mental processes as well as in dead bodies; we may 'forget' them entirely, or they may get overrun by all sorts of other and more recent processes, so that we cannot live them over again just as they were.

The chief reason for the occurrence of the 'blanks' in the introspection of § 4 was that you were trying to observe your ideas while they were going on. How fatal this mistake is you will realise at once if you seek to introspect a *feeling* during its course. Try to observe your enjoyment, while you are enjoying yourself: the observation drives the enjoyment out of mind altogether. You do not drive an *idea* out of mind in the same way, by the wrong use of introspection; but you alter it and interfere with it very considerably.

Here, as before, the difficulties, formidable as they seem, can be overcome by hard work. Since you carry the material for introspection about with you, you can practise it at all times and in all places; and practice makes perfect. For some little while you will be baffled; but presently, very likely when you are least expecting it, you will come face to face with a concrete process and find yourself observing it, — and then you are on your way to be a psychologist.

Many of our most interesting mental processes are very hard to catch, and, unless one seizes upon them promptly, will be gone before there is an opportunity to introspect them. One may, however, cultivate an attitude of alertness towards one's psychological experiences, may learn (as it were) to meet them half-way, — or rather to pounce upon them before they have lapsed from memory as well as from the present consciousness.

Morbid introspection.

We are often warned by moralists against 'giving way to a morbid introspection.' But 'morbid introspection' is very different from the introspection of the psychologist. What the moralist condemns is a continual occupation with the affairs of self, to the neglect of the wider interests of family or society or nation, — an exaggerated notion of the importance of one's own acts and motives, and the consequent failure to see oneself in a right social perspective. In other words, he is looking at the practical side of life; whereas the psychologist's interest is scientific. The psychologist introspects his own mind not because it is worth more than others, but because it is the only mind accessible to him.

In psychology, experiments are needed

§ 13. **The Psychological Experiment.** — Experiments are more needed in psychology, perhaps, than in any other science. For the facts of nature are, at any rate, open to all observers alike; whereas the facts of mind are never open to more than one person. If then the results of introspection are to have any scientific value, — if we are to have any assurance that they hold equally for all minds, — they must evidently be obtained under standard conditions: so that every enquirer may repeat for himself the observations recorded by other enquirers as true in their particular cases.

The immediate conditions of mental processes are brain processes. Hence it is these that we should record and vary, if we were able to perform a direct psychological experiment. Plainly, however, we cannot get at our brain processes; the brain is locked up in the skull, and can be affected only indirectly, by way of the external organs of the body which are connected with it by nerve fibres.

and can be performed.

Still, experiment is possible. The processes that go on in a particular part of the brain are conditioned (1) by the excitations coming in along the nerves that lead to it, and (2) by the state of all the rest of the brain. The excitations are dependent, in their turn, upon the stimulation of the external bodily organ from which the nerves start; so that by varying the *stimulus* in a definite way, we can vary the brain processes in a definite way,—just as well as if we had access to them directly. On the other hand, we try to keep the rest of the brain in the same state throughout an experiment by arranging (1) that disturbing stimuli shall be shut off, and (2) that the observer's 'frame of mind' shall remain the same.

A psychological experiment.

Suppose, *e.g.*, that we wished to find out by experiment how our idea of a *printed word* is formed,—whether we read it letter by letter, or take in its form as a whole, or take in the form and certain letters. The immediate conditions of the idea are cortical processes in the back of the head, where the excitations carried in by the optic nerve are received. These are out of our power. But they depend (1) upon the excitations coming in through the eye, and (2) upon the state of the rest of the cortex. (We saw in § 6 that the cell-clusters which receive, and the cell-clusters which send out excitations are connected by nerve fibres; the same thing is true of all the different receiving clusters, those connected with the eye, ear, mouth, skin, etc.) Now we can control the excitations, because we can present to the eye any kind of word-stimulus that we care to use, altering or omitting particular letters of the word, etc.; and we can record the nature of the stimulus in every case, so that other psychologists are able to repeat our experiments. We try, further, to keep the rest of the cortex steady (1) by shutting out other stimuli. Thus we work in a darkened room, and flash the word on a screen, all else remaining dark. And (2) we do all we can to preserve an equable frame of mind; knowing that if the thoughts are allowed to wander, new processes will be arising in various parts of the cortex, and the equilibrium of the brain will have been upset.

It is clear that in most cases two persons are needed for the performance of a psychological experiment. The 'subject' or 'observer' introspects; the 'experimenter' arranges the conditions. Thus the subject would introspect, in the instance given, to see what contribution the various stimuli made to the formation of the idea under investigation; the experimenter would arrange the instruments for flashing the stimuli, would do his best to keep the subject in an even frame of mind, and would record the character of the stimuli given and any indications that the observer might show (by incidental remarks, by restlessness, etc.) of steadiness or unsteadiness of thought.

Community of work is thus assured

In this way, introspection can take place under standard conditions; the psychologist can experiment. The conditions to be repeated and regulated are those of (1) stimulus and (2) frame of mind. If they are properly described, any psychologist can satisfy himself of the correctness or incorrectness of a result obtained by any other psychologist: he can make precisely the same observation under precisely the same circumstances. If a number of psychologists, after many experiments, reach the same result, that result is a psychological fact of scientific value.

§ 14. **The Method of Psychology.** — It follows, from the two foregoing Sections, that the method of psychology is the method of *experimental introspection.* Only by looking inward can we gain knowledge of mental processes; only by looking inward under standard conditions can we make our knowledge scientific.

Experimental introspection the psychological method.

Even when we are examining a mind as if it were an object in the outside world, — when we are trying to understand the mental processes of a child or a dog or an insect as shown by conduct and action, the outward signs of mental processes, — we must always fall back upon experimental introspection. For our own mind is our only means of interpreting the mind of another organism; we cannot imagine processes in another mind that we do not find in our own. Experimental introspection is thus our one reliable method of knowing ourselves; it is the sole gateway to psychology.

The first psychological laboratory.

Psychology is a very old science: we have a complete treatise from the hand of Aristotle (B.C. 384–322). But the experimental method has only recently been adopted by psychologists; the first psychological laboratory was opened by Professor Wundt at Leipsic in 1878–9. It now seems certain that there is no mental process that cannot be observed experimentally. There are many that have not yet been satisfactorily investigated; but the reason is simply that the use of the experimental method requires training and practice, and that twenty years is too short a time for the re-making of a whole science.

Let us take an instance to show that experiment is possible under very unfavourable conditions. We said in § 6 that it is only when the cortical cells which receive incoming excitations are exploded that a mental process arises. But it is plain that, when once these cells have been exploded by an excitation coming from the *outside*, they can be exploded later from the *inside*. Thus we should never know what *green* was unless a certain stimulus had been presented to the eye and the green-cells of the cortex, if we may use that phrase, had been exploded by the excitation sent inwards along the optic nerve. But when once we have 'seen' green, we know what green is: we can remember green, or imagine it, even if we are looking at black or red. The green-cells are, in this case, exploded from within (by the action of neighbouring or connected cells, by change of blood supply, etc.); there is no external stimulus. Here, then, the circumstances are as unfavourable for experiment as they can well be; we seem to have no control over the excitation, the bodily condition of the remembered or imagined green.

Nevertheless, we can experiment. For we can (1) keep distracting stimuli away, and (2) introspect the memory-green or fancy-green in an even frame of mind. These are standard conditions; they can be accurately recorded by the psychologist who introspects; and they can be repeated by other psychologists after him.

Special and general rules of introspection.

§ 15. **General Rules for Introspection.** — The rules for introspection are of two kinds: general and special. The latter refer to the regulation of stimulus, and differ in different investigations; the former refer to the frame of mind, and must be observed in all investigations alike.

Special rules of introspection.

Suppose, *e.g.*, that you were trying to find out how small a difference you could distinguish in the smell of beeswax; that is, how much greater the surface of the stimulus must be made if the sensation of smell is to become noticeably stronger. It would be a special rule that you should work only on dry days; for beeswax smells much stronger in wet than in fine weather. Or if you were trying to discover how well you could call up the smell of beeswax in your mind, without having the wax under your nose, it would be a special rule that you should perform the experiment in a perfectly odourless room, so that the excitation set up from inside the brain should not be interfered with by foreign stimulations set up in the smell-cells of the nose. Again, if you were trying to distinguish all possible tints of blue, it would be a special rule that you should work always by the same illumination: always by dull daylight, or always by the same electric light, etc. For a blue seen in sunlight is different from the same blue seen in dull daylight.

General rules: The general rules of experimental introspection are as follows:

impartiality, (1) Be impartial. Do not form a preconceived idea of what you are going to find by the experiment; do not hope or expect to find this or that process. Take consciousness as it is.

attention, (2) Be attentive. Do not speculate as to what you are doing or why you are doing it, as to its value or uselessness, during the experiment. Take the experiment seriously.

comfort, (3) Be comfortable. Do not begin to introspect till all the conditions are satisfactory; do not work if you feel nervous or irritated, if the chair is too high or the table too low for you, if you have a cold or a headache. Take the experiment pleasantly.

freshness. (4) Be perfectly fresh. Stop working the moment that you feel tired or jaded. Take the experiment vigorously.

The reasons for these rules should be obvious. Attention to the stimulus makes it clearer, and holds it in mind longer. Moreover, if the attention wanders, other processes than that under investigation come into consciousness, and interfere with the experiment. The same thing happens if you are uncomfortable. Discomfort draws your attention from the object of the experiment to the source of the uncomfortable feelings. And fatigue means that your brain is not in good working order.

Summing up, then, we may say that the rule of psychological work is this. *Live impartially, attentively, comfortably, freshly, the part of your mental life that you wish to understand. As soon as it is past, call it back and describe it.*

Questions and Exercises

[The exercises will be best performed in class, or by several students who are working together, as comparative results are desirable.]

(1) Numerous methods may be devised to test accuracy of observation. You may, *e.g.*, draw a plan, to scale, of some room familiar to you; putting doors, windows and furniture in their right positions. Or draw from memory the distortion that an oblong table suffers when you look at it from one corner. Or draw pictures from memory of an oak-leaf and an elm-leaf. Or have some simple geometrical construction, some arrangement of dots and lines and curves, drawn on a blackboard: look at it for 5 sec., and then try to reproduce it on paper.

If two or three persons have recently witnessed an accident or a theatrical performance, or have been present at a social gathering, let them write out a detailed account of what they experienced, and compare notes. Or let a number of people walk a certain distance down a country road, or a street, and afterwards write out their experiences, and compare notes.

(2) Four newspapers describe the same gown as (*a*) gold brocade, (*b*) white silk, (*c*) light mauve, and (*d*) sea-green, with cream or ivory sheen on it. How could this difference of opinion have arisen?

(3) Newton is said to have discovered the law of gravitation by observing the fall of an apple from the bough. Was this a simple observation, or could it be said to have anything of the experiment about it?

(4) How does the psychological experiment resemble, and how does it differ from, the physical or chemical experiment?

(5) Try to introspect an idea while it is going on. Introspection is a mental process, or rather a group of mental pro-

cesses. Hence the consciousness which contained the idea is intruded on by other processes from the moment that you begin to introspect. What are these other processes that make up introspection? In other words: what changes do you find set up in consciousness by your attempt to introspect an idea (say, that of an elephant) while it is still passing through your mind?

(6) You may test the power of bias in this way. Make a series of coloured papers, choosing those that are as nearly as possible of the same brightness, that range from pure red to a pronounced bluish red. Cut a circle, of about 2 cm. diameter, from each sheet. Give the observer a rolled tube of black cardboard to look through. Tell him that you are going to show him a series of reds, beginning with pure bright red and passing into very dark red; and ask him to say when the first really dark red comes. Now lay the circles one by one on the table, in the order from red to bluish red, letting the observer see each in turn for some 2 sec. See how far the series can go before he says: "The reds are not getting darker; they're getting bluer!"

Or take a long piece of wire. Let the subject close his eyes, and give him one end to hold. Tell him that you are going to put the other end in a candle flame, and ask him to say when he senses the heat. Take the other end in your hand: walk up to the table on which the subject knows the candle stands, and strike a match, — but do not light the candle. Notice by the seconds' hand of your watch how long it is before the subject senses the imaginary heat. If the experiment fails, he is already so far an impartial observer; but probably it will not fail.

(7) What are the characteristics of a good 'subject'? Of a good experimenter?

(8) Can you get from psychological observation and experiment any advantages, in the way of mental training, which you cannot get from observation and experiment in the other sciences?

References

James, *Textbook*, pp. 160–175.
Sully, *Human Mind*, vol. I., ch. ii.
Titchener, *Outline*, §§ 9, 10, 33.
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Wundt, *Outlines*, § 3.

CHAPTER III

Sensation

§ 16. **Sensations and their Classification.** — A sensation is an elementary mental process. It cannot be split up, by the most persistent introspection under the strictest conditions, into any simpler processes.

It is a characteristic of sensation that it comes to consciousness by way of a special bodily organ, a sense-organ. Or, in more technical language, its bodily condition is the stimulation of some particular bodily organ. We are accustomed to think that there are five of these sense-organs: eye, ear, nose mouth and skin. Scientific investigation has shown, however, that there are more than twice that number.

Definition of sensation.

Remember that a sensation never occurs quite alone in our mind; consciousness is always made up of more than one process. We can, however, get an approximately pure sensation by experiment. We shut off distracting stimuli, and focus our attention upon some single process in consciousness (*cf.* § 8).

Remember, too, that the 'particular bodily organ' may mean either (1) the external organ, like eye or ear, or (2) the part of the brain cortex to which the nerves from eye or ear run (*cf.* § 14, and Question 11, p. 23).

As every sensation is set up in some definite bodily organ, we shall, naturally, classify sensations by grouping them under the organs through which they come. We shall thus have eye sensations, nose sensations, skin sensations, etc., to describe and dis-

The different kinds of sensation.

cuss. There are, however, some organs that give us more than one set of sensations: thus the ear, which we think of as giving us only sensations of hearing, really gives us a very different sensation as well, — the sensation of giddiness. And there are different organs that furnish similar sensations: thus not only the skin, but the joints also, furnish the sensation of pressure. The reason is simple. What we call the ear contains two different cell-groups, connected by nerves with different parts of the cortex; while skin and joint contain similar cell-groups, connected with the same or similar parts of the cortex. We shall, of course, take account of these facts in making out our list of sensations.

§ 17. **Sensations from the Eye.** — The eye is the most elaborate and the most important of the instruments by which we gain knowledge of the outside world. It is a single sense-organ, and all the sensations that come through it are sensations of one kind, — sensations of sight. But the human eye has 'evolved'; it is the final product of a long course of development, during which the organ has gradually become more and more delicate. Hence we can distinguish two strata of sight sensations; a lower, primitive layer, which dates as far back as the existence of the organ of sight itself; and a later, more complicated layer, which has appeared more recently. The primitive sensations are those of black, white and grey. We can distinguish a large number of these *brightness sensations*, as they are called. But there can be no doubt that the general difference

Sensations of brightness.

between black and white, light and dark, is sensed even by the eye-specks of the jelly-fish. The later sensations are those of *colour*.

Colour sensations fall into four series or lines. The first runs from red to yellow, through reddish yellow or orange; the second from yellow to green, through yellowish green; the third from green to blue, through greenish blue; the fourth from blue back again to red, through bluish red (violet and purple). All the colours but purple are contained in the rainbow, and in the artificial rainbow, the solar spectrum. **Sensations of colour.**

In ordinary conversation we speak of black, white and grey as 'colours.' Notice that they belong to a different group of sensations from the true colours, and that they should be called 'brightnesses' or 'colourless visual sensations.'

The best way to understand the *eye* is to think of it as a photographic camera. It has an automatic diaphragm, the iris (the circle that we refer to when we speak of 'brown' or 'blue' eyes), which regulates the opening of the pupil according to illumination. Behind the iris, in the pupil, is a lens which focusses automatically, — not by coming forwards or retiring inwards, but by altering its curvature. Behind the lens is a dark chamber. The back wall of this chamber is covered by a sensitive film, the nervous network or *retina*, upon which visual images are formed. The film is self-renewing, so that images can succeed one another upon it very rapidly. The action of light upon it sets up processes of chemical decomposition, just as in the real photographic plate. (*H.*, Lesson IX.; *N.*, ch. xliii.) **The eye a photographic camera.**

Even if we knew nothing of the eyes of lower animals, we should be forced to believe that the brightness sensations are more primitive than those of colour. Objects may be black or white or grey; they need not show the faintest **Sensations of brightness are older than those of colour.**

trace of colour. But we never see a 'pure' colour; every colour that we know is really a mixture of pure colour with brightness. If you look at a spectrum in very faint light, you do not see any colour in it at all; you see a band of grey. Evidently, then, this grey must be present in the colours when you do see them. Again: people may be perfectly colour-blind, and still see things in the world as black and white and grey. But if people are brightness-blind, if they do not see black and white and grey, they are totally blind and do not see anything. And again: the retina has a more complicated structure in the central than in the surrounding parts of its surface. But it is only in the central parts that we see all the colours; as we move out over the outlying parts we gradually lose the colour sense, until finally, at the edges of the retina, we see nothing but brightness.

The system of sight sensations.

In order to get an idea of the enormous number of sight sensations, — brightnesses and colours (remember that 'colours' are really mixtures of pure colour and brightness), — it is worth while to make a diagram.

Suppose that we have a square surface (a piece of card or paper), which is tinted a *neutral* grey, — a grey that lies exactly half-way between dead black and brilliant white. Leaving the grey in the centre, we work outwards towards the edge of the square, mixing in more and more colour as we go. At the four corners we put the four *principal* colours, the end-colours of the four colour series (red, yellow, green and blue); along the sides come the intermediate colours. When the surface of the square is filled in, we have on it all the possible sensations which can be built up from neutral grey, — all those which are of the same brightness-value as that grey; beginning with the grey itself, and ending with the purest colours that can be got with this grey in them. Thus, passing from green to the centre we have green, slightly grey green, greyer green, still greyer green, . . . grey; and similarly with the other colours (Fig. 1).

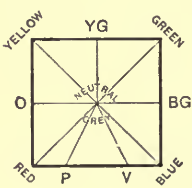

FIG. 1

Now we take a second card, tinted a little *darker* grey, and mix in our colours as before. The corner colours will be different; red will be getting a tinge of reddish brown, yellow a tinge of brown, green a touch of olive and blue a touch of indigo. Since we cannot distinguish so many shades between this darker grey and reddish brown, etc., as between the neutral grey and red, etc., our square will be a little smaller than the former square

We take a third square, tinted a little *lighter* grey, and proceed as before. Red now verges to flesh-colour; yellow to straw-colour; green becomes pale green; blue tends towards sky-blue. Our square is again a little smaller than the first was.

So we go on, until our central grey becomes dead black in the one direction and brilliant white in the other: the squares grow smaller and smaller, till at last (at black and white) we have only points, not surfaces at all. Laying the squares together, in the right order, we have a double pyramid (Fig. 2). The line joining apex to apex is the black-grey-white line; the square base is surrounded by the purest colours that we can get; the outside surface shows the browns, olives, pinks, pale greens, etc.: and wherever we cut into the pyramid we have a sensation-line running from a given colour to a given grey. When all the sensations are counted up, they amount to more than 30,000.

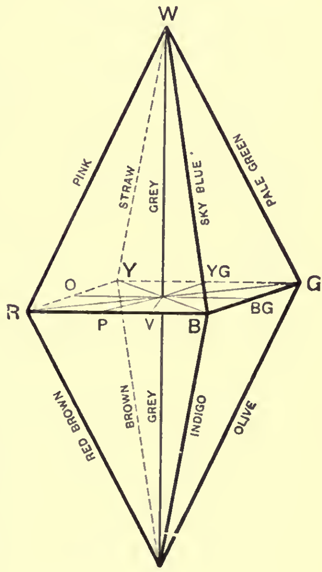

FIG. 2

The *explanation* of sight sensations, the statement of their bodily conditions, is a difficult matter, and the reader must take it largely on trust. The most satisfactory explanation that we have at present we owe to Professor Hering, now professor of physiology in the University of Leipsic. In its latest form it is briefly as follows: **Hering's theory of vision.**

(1) There are in the 'visual apparatus' (retina, or parts of the brain connected with it, or both) three chemical substances that are differently affected by light (*i.e.*, by ether waves).

(2) Each substance is the seat of two chemical processes, *de*composition and *re*composition. The two processes are attended by two different sensations in each case. In one substance, the processes give us white and black; in another, red and green; in the third, yellow and blue. There are thus six different chemical processes that can be set up in the retina; and from the six *principal* sensations accompanying them we can get the whole sum of sight sensations. Pale purple, *e.g.*, means a mixture of the white-process, the red-process and the blue-process; all three substances are called upon to furnish it.

(3) The black-white substance is affected by *every* light stimulus; the other two substances only by certain forms of stimulus.

(4) If red and green light fall upon the same part of the retina, the colours cancel each other, and nothing is left but a sensation of grey. This is because the chemical processes of decomposition and recomposition are antagonistic or opposite processes; they work against each other in the visual substance.—The same thing is true of yellow and blue.

If black and white fall on the same part of the retina, however, we see a *mixture* of black and white, a grey; there seems to be no cancelling of black by white, as there is of green by red. Really, black and white do cancel each other in the retina; there is no grey-process there. But the cortical cells with which the optic nerve is connected are always in a state of commotion (owing to changes of temperature, etc.), whether there is a stimulus before the eye or not; and this commotion gives us the 'intrinsic' or 'subjective' sight sensation, the sensation of grey. (See *F.*, 902.)

Sensations of noise and tone.

§ 18. **Sensations from the Ear.** — Next in importance to the eye stands the ear. Sensations of hearing, like those of sight, have evolved or developed;

and we can distinguish two stages of hearing sensations, (1) sensations of noise and (2) sensations of tone. But we can go back a step farther. All sensations of hearing have been in some way developed from sensations of jar or shake, which were not heard at all.

The human ear is extremely complicated; but it has kept some of the primitive shake-organs alongside of the later growth. The shake-organ, as we have it ourselves now, has nothing to do with hearing, and must therefore be treated of separately.

(*a*) *The Ear as Organ of Hearing.* — Our sensations of hearing are (1) sensations of simple *noise*, corresponding to the brightness sensations of the eye, and (2) sensations of *tone*, corresponding to colour sensations. A noise is hard and unmusical; it is set up by a shock or jerk of the air-particles. A tone is smooth and musical; its stimulus is a repeated wave-movement of the air-particles. The pop of a soap-bubble is a noise; the sound that you get by blowing across the mouth of a bottle is a tone.

Although tones and noises sound together far more often than they sound separately, and mix very readily, their mixture is never complete enough to give us a simple sensation, as that of colour and brightness does. The 'tone' of a violin owes a good deal of its effectiveness to the *noise* made by scraping the bow over the strings; but we are quite well able to distinguish the scrape from the accompanying musical tone.

A tone diagram would be a spiral line, like a screw-thread, with the deepest bass tone at the one end, the shrillest treble tone at the other, and the rest arranged in musical order between the two. Round each circle of the spiral are set the tones that we can distinguish within the limits of an octave. The line must be made spiral, *i.e.*, must keep returning as it advances towards the point from which it started, because the tones that bound an octave are more nearly like each other than any other two tones upon the scale; just as the colours that bound the spectrum, red and violet, are more like each other than are any other two colours in the spectral series. On the screw-thread these limiting tones lie directly above and below one another. Music employs only about 90 of the 11,000 tones that we can distinguish. The reasons for this curious fact we shall discuss later (§ 42). — The noise diagram would be a straight and much shorter line; we cannot distinguish nearly so many noises as tones; and there is no recurring likeness of noise to noise, to make the line a spiral.

The ear a piano.

If the eye is a little camera, the organ of hearing is a tiny piano: a piano with a keyboard for the air to play on, with 11,000 strings behind the keyboard, and with a damper to stop the movement of the strings after they have sounded. (That is why we can speak so quickly; the sound of each word is damped before the next word comes.) When the pianist is a system of air-waves, we hear a tone; when it is an air-shock, a noise. Generally, several pianists of both kinds are playing together. (*H.*, 215 ff.; *N.*, chs. xxxiv. ff.)

Sensation of giddiness.

(*b*) *The Ear as Organ of Equilibrium.* — The part of the ear which resembles the primitive shake-organ gives us the sensation, not of tone or noise or, indeed, of hearing at all, but of *giddiness*. Giddiness means that we have been shaken, our physical balance disturbed, — that we are in danger of falling. Hence though it is very unpleasant, it is also very useful.

We might lose our balance in three ways: by confusing up with down, back with front, right with left. And there are three shake-organs in each ear, which help us to keep our balance steadily in these three directions of space. Nod your head sharply up or down, turn it sharply to right or left, drop it sharply towards the one shoulder or the other; in every case you will get a momentary giddiness. (*F.*, 729.)

Fig. 3 shows a model of a single shake-organ. The grain of sand, *s*, is balanced on the hairs coming from a group of cells which are connected with a nerve, *n*. You can easily see that a shake of the air or water surrounding the organ would shift the balance of the grain upon the hairs and bend some of the hairs down. In this way an excitation would be set up in the nerve, and carried to the brain.

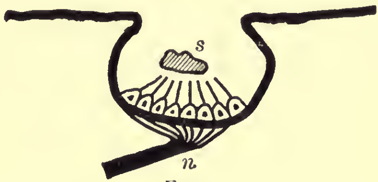

FIG. 3

Sensations of pressure, temperature and pain.

§ 19. **Sensations from the Skin**. — The skin is an organ of a very different character from the eye or the ear. For it is not merely a sense-organ: it has to do a great deal for the body, besides furnishing sensations for consciousness. Thus it protects the underlying organs from injury, it carries the hair and nails, it contains oil-glands and sweat-glands. But there are in it, notwithstanding, no less than three distinct kinds of sense-organs. One tells us of the weight of objects (sensation of *pressure*); another of their temperature (sensations of *heat* and *cold*); and a third of the injury they are doing us (sensation of *pain*).

You cannot get these four sensations from any and every part of the skin; their organs are sprinkled or dotted over its surface. They are all, probably, very old sensations; pressure and pain, at any rate, are older even than white and black and noise. And their bodily organs are simple; just little bunches of nerve-fibrils, sometimes lying by themselves, and sometimes twined round the root of a hair or a few cells, in the thickness of the skin. (*H.*, 206 ff.; *F.*, 1037, 1044.)

§ 20. **Sensations from the Mouth and Nose.** — We may treat of these two organs together, because their sensations are intimately blended in everyday experience, and because the office of both of them is to stand guard over digestion, to secure the health of the internal bodily organs.

Sensations of taste.

(*a*) The mucous membrane of the *mouth* is sensitive to pressure, heat and cold, and pain. But we also get, from various parts of the cavity of the mouth, the four sensations of *taste:* sweet, bitter, sour and salt.

It is at first difficult to believe that there are no more than four distinct tastes. But what we call 'taste' in ordinary conversation is for the most part a mixture of smell and taste. The reason that we cannot 'taste' things when we have a cold in the head is that the nasal passages are blocked, so that we cannot *smell.* A good deal of our daily food is absolutely tasteless.

Taste beakers.

At different parts of the tongue and at the back of the mouth we find little bottle-shaped pits. The mouth of the bottle receives the taste stimulus (the sweet, etc., substance). Inside the bottle are the taste cells, from which the nerve runs through the bottom of the bottle to the brain. (*H.*, 209.)

Sensations of smell.

(*b*) There are two patches of mucous membrane in the two *nostrils* which give us sensations of *smell.* We know that there are a great many kinds of smell; and there seem to be groups or classes of smell sensations, like those of tone and noise, or brightness and colour. But we cannot yet say how many there are, or which are the more primitive.

The smell cells carry hairs, which project into the cavity of the nose, and catch the odorous particles as they are carried into the nostrils by breathing. (*H.*, 211.)

The organ of smell is thus more simple even than that of taste. It may be that, in man, the organ of smell is degenerating, while that of taste is not changing. This would account for the difficulty that we have in deciding the number of different smells that can be distinguished. On the one hand, the nose is very readily fatigued; on the other, the smell-brain does not function well, — we have largely lost the power of discriminative attention to smells.

§ 21. **Sensations from Internal Organs.** — A last, and by no means unimportant source of sensations is to be found in certain internal bodily organs. With two sets of these, (1) and (2) below, we are fairly well acquainted; of the rest, brought together under (3), we know very little.

(1) *Bone, Muscle, Tendon.* — The bones of the body turn in sockets. They are moved by the muscles, which are tied to them by sinews or tendons. We have from the muscles sensations of *pressure* and *pain;* from the sinews a new sensation, that of *strain;* **Strain.** and from the joints or bone-sockets the familiar sensation of *pressure.*

(2) *The Alimentary Canal.* — The body is not solid; **Hunger, thirst, nausea.** it is pierced by the alimentary canal, whose duty is to take in food and get rid of waste. From the upper parts of this canal we have three new sensations. The extreme back of the mouth and top of the throat give us *thirst;* the tube running from mouth to stomach, *nausea* or sickness; the stomach itself. *hunger.* No new sensations come from the intestines.

(3) It is probable that the *lungs*, *blood-vessels* and **Stuffiness, itching, etc.** *bladder* furnish new sensations. We have lung sensations in 'bracing' and 'stuffy' feelings; blood-vessel sensations in tingling, itching, and 'pins and needles'; and bladder sensations in the 'stir up' of the inside organs that comes, *e.g.*, with the emotion of fear.

The sense-organs dotted over the surface of the joints resemble those found in the skin. On the other hand, the nerves that run to the brain from muscle and tendon start from organs which are peculiar to these tissues. Nevertheless, the muscle sensation of pressure is not distinguishable from the skin sensation of pressure. There may possibly be a special sensation of muscular fatigue: but this is very doubtful. The organs of hunger, thirst and nausea are not known, though the sensations can be localised in the mucous membrane of stomach, soft palate and œsophagus respectively. (*H.*, 176, 203; *F.*, 1048, 1059.)

The 'sensation' of *tickling* is really a complex of sensations. It contains a light pressure sensation; a sensation of temperature, a thrill of warmth or shiver of cold; a sensation due to change of blood-circulation, of the same kind as tingling and itching; and, probably, a number of muscular pressures, due to the spasmodic contraction of the muscle-sheet lying just below the part of the skin to which the weak stimulus is applied.

Fig. 4. (which is not quite accurate, from the physical standpoint, but still accurate enough for our present purpose) shows how the sensations set up in muscle and tendon may vary independently of each other. The four diagrams represent the arm, bent at the elbow-joint; the upper and lower arms are held together by a muscle, from either end of which tendons run to the bones. In *a* and *b* there is the same degree of muscular contraction, though the pull upon the tendons is very different; in *c* and *d* the strain is the same, but the muscles are differently contracted.

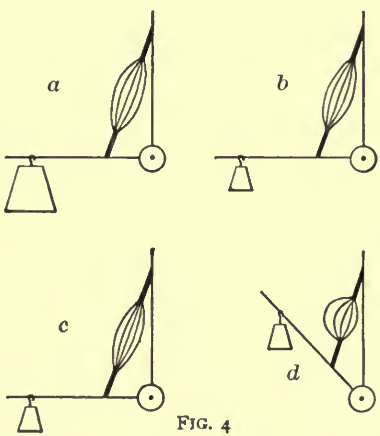

FIG. 4

Quality and intensity of sensations.

§ 22. **Intensity of Sensations.** — So far we have been considering only one aspect of sensations, their *quality*. Quality is what makes one sensation different from another. All the different tints and hues of colour are qualities of sight sensations; the shades of grey, the differences of tonal pitch, the kinds of smell, are all qualities. A red which differs from another red in hue is a different sensation; a tone which differs from another tone in pitch is a different sensation.

But a sensation may remain the same sensation, the same pitch or tint or smell, and yet vary in *strength* or intensity. A pressure may be the pressure of an ounce or of a pound; it is always pressure, one quality, but its strength differs. The tone that you get by blowing across the mouth of a bottle may be loud or faint, though it is still the same pitch, the same tone. The weight you carry may strain your arm very little or a great deal; the sensation of strain from the tendons of the arm is the same in both cases, but the amount of it is different.

Relation of stimulus intensity to sensation intensity.

Here a very interesting question arises: the question whether, if I add to the amount of stimulus (add to the heaviness of the weight, or the strength of the sound, or the illuminating power of the light) I add *in equal measure* to the intensity of the corresponding sensation. Of course, the strain of carrying three pounds is greater than the strain of carrying one: but is the strain sensation in the first case three times as strong as the strain sensation in the second? The answer to the question is given by what is called Weber's Law.

Weber's law.

§ 23. **Weber's Law.** — Suppose that I have laid a pound weight in the scale, and measured out a pound of sugar. If I add another pound weight, I must have twice as much sugar to balance the scales; if I add a third pound, three times as much sugar; and so on.

Now suppose that I am measuring, not sugar, but the sensation of pressure. A pound weight on the skin gives me a sensation of pressure, P. Two pounds give me a stronger pressure, — let us say, $P+p$. Will three pounds give me $P+2p$?

Experiment says no. If my pressure sensations are to be P, $P+p$, $P+2p$, $P+3p$, etc., then the weights used must be 1 lb., 2 lbs., 4 lbs., 8 lbs., etc. That is: if the third pressure is to be as much stronger than the second as the second was than the first, then the third weight must be *proportionately* as much larger than the second as the second was larger than the first. To get $(P+p)-P=(P+2p)-(P+p)$, we must have second weight : first = third : second (or, using numbers, 2 lbs. : 1 lb. = 4 lbs. : 2 lbs.).

Its usefulness.

The usefulness of this law is clear. We can find our way about in the world, recognise our clothes, books, furniture, etc., as well on a dull day as in the most brilliant sunshine. The relation of the brightnesses remains the same in all cases; and a difference that is *relatively* the same for stimuli is *absolutely* the same for sensation. It is the same principle that enables us to appreciate pictures, — to see that this painting represents a seascape, and this a moonlight effect. And it is the same principle that enables us to recognise a musical melody, although it may now be played in quite a different key from that in which we are familiar with it. — The reasons for the law are to be looked for in the physiological behaviour of nervous substance. We cannot enter upon them here.

E. H. Weber (1795–1878), after whom the law is named, was professor of physiology in the University of Leipsic. It may interest the reader to know of one of Weber's own experiments: in the text above we have been merely 'supposing.' Weber found, then, in experiments with weights, that it is just as difficult to distinguish between the pressure of 29 and 30 *half-ounces* as between those of 29 and 30 *drachms;* although the difference of weight in the first case is four times as great as it is in the second (1 oz. = 8 dr.). Sameness of difference in sensation means proportional sameness of difference between stimuli.

Questions and Exercises

(1) Sight. (Try to account for the results of these experiments by applying Hering's explanation to them.)

(*a*) The laws of colour mixture.

1. Mix on the colour-top (not with pigments) two neighbouring colours; red and orange, indigo and violet, etc. Notice that the result is a colour that lies midway for sensation between the two chosen.
2. Mix two complementary or antagonistic colours, to get grey. With the coloured papers (which do not give Hering's colours exactly) you will not get a grey from red and green; you must take red and bluish green. The yellow and blue will be very nearly, if not exactly, complementary.
3. Mix three colours to get grey: red, yellow, greenish blue; red, green, violet; etc.
4. Mix all the spectral colours, and all the spectral colours with purple, to get grey.

(*b*) The persistence of vision; after-images.

5. Look steadily at a red patch on a white ground. After 20 sec. remove the red, and you will see a patch of the antagonistic colour (bluish green). Try with all the colours, and with black. Try with white, on a black ground.

(*c*) Indirect vision.

6. Bandage the left eye, and look steadily with the right at a white point on a black screen. Let an assistant move a coloured patch (held on a black straw) from the white point outwards (to your right) along the screen. You see the white point with the centre, the moving colour with outlying parts of the retina. Notice that the colour changes, as it moves; and that finally you see no colour at all, but simply a black or grey. — Or tack the coloured patch to a wall, some distance to the right of the observing eye. Look straight at the wall in front of you; and then gradually turn the eye outwards, toward the patch. Notice the change of colour, as the eye moves.

(*d*) Contrast.

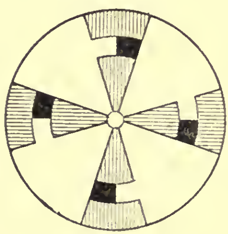

Fig. 5

7. Lay a red patch on a white sheet of paper, and cover both with white tissue-paper. The white surface will seem slightly tinged with bluish green.
8. Cut discs like that of Fig. 5 (where the white parts stand for white, the black for black, and the shaded parts for some colour) and spin them on the colour-top. If the colour is orange, you see a yellowish surface with a bluish ring; if it is green, a pale greenish surface with a purplish ring; etc.

Contrast is due, on Hering's explanation, to the physiological reciprocity of the different regions of the retina. If *de*composition is set up at one point of the retina. *re*composition is set up in the neighbouring parts, and *vice versa*. If we look at a blue patch on a grey ground, we have, as *direct* effect of the stimulus, a sensation of blue; as its *indirect* effect, a sensation of yellow-grey over the parts of the grey ground that adjoin the blue patch — Other writers regard contrast as a case of apperceptive illusion (see below, p. 117). In all probability, however, Hering's view is correct.

(2) Hearing.

(*a*) Discrimination of tones.

9. Take six short pieces of gutta-percha tubing, and soften one end of each piece in warm water. Pinch this end together, so that the opening is a mere slit. Wire the pieces to the necks of six bottles so that you get their tones by blowing into the tubing. Tune them (by pouring water in, as required) to two consecutive notes on the piano: three of them, say, to the *c*, and three to the *c*-sharp of the middle octave. This tuning must be done by some one with musical experience and a good musical ear.

Two of the bottles, a *c* and a *c*-sharp, you set aside as standards. Now take a *c* bottle, and pour in a very little water; thus raising its pitch till its tone is just perceptibly higher than that of the standard *c*. Then take the remaining *c* bottle, and raise its pitch in the same way, till it sounds just perceptibly higher than the *c* that you have already raised. Go on in this way with the two bottles, till one of them sounds the same tone as the *c*-sharp standard. Note how many tones you can discriminate between the *c* and the *c*-sharp. — At the first trial you should get at least 8 intermediate tones, and with practice many more.

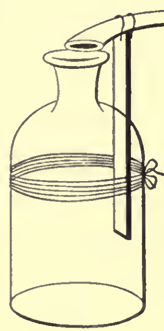

FIG. 6

Repeat the experiment with the *c*-sharp bottles, working downwards (by pouring water out) towards *c*. Note how many tones you can hear between the *c*-sharp and the *c*.

If you regard the experiment, in this form, as too laborious, use one of a set of Quincke's tubes (Fig. 7). The cork in the lower tube lowers the tone an octave. (*N.*, p. 366.) Water may be

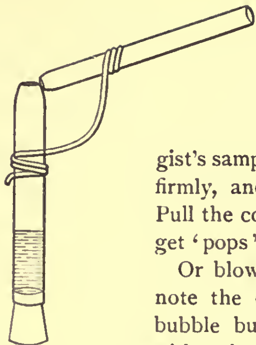

FIG. 7

poured in, as required. Blow evenly and steadily, and not too strongly.

(*b*) Quality of noise.

10. Procure a number of druggist's sample phials, of different sizes. Cork them firmly, and arrange them in the order of size. Pull the corks out sharply, in succession. You get 'pops' of different quality.

Or blow a large and a small soap-bubble, and note the difference in their snap. The small bubble bursts with a sharp pop, the large one with a thud. These are qualities of noise; there is no tone present.

The experiment is more striking if you use, instead of air, a mixture of hydrogen and air. In that case you touch the bubbles off with a match. Be careful that they are well away from the air-hydrogen mixture before you ignite them.

(3) Pressure and Temperature from the Skin.

11. Mark out with ink a square centimetre of skin on the back of the hand. Work over this lightly, in all directions, with a piece of pointed pith or cork. Move the point slowly. As it travels, sensations of pressure will flash out at the pressure-spots; between the spots you will have no pressure sensation. Make a map of the spots on a square cm. of cross-section paper, putting down an ink-dot for every spot.

12. Work over the same place with a pointed metal tube filled first with hot and then with cold water. Sensations of heat and cold will flash out at the temperature spots in the same way; between the spots you will have no temperature sensation. Make maps of the hot and cold spots. Compare the three maps and see which has the most spots, and on what patterns the spots are arranged. — Does introspection show any differences between the sensations of pressure, heat and cold, over and above their qualitative differences?

(4) Muscle, Tendon and Joint.

13. Hold your arm out straight, and fold it slowly in towards your chest. Notice the pressures in the muscles of the fore and upper arms and in the elbow joint.

14. Clench your fist, slowly. Distinguish the pressures on the skin, the pressures in muscles and joints, and the strain in the tendons.

(5) Taste.

15. Prepare a number of 'tastes' in solution. Stop the nose with cotton wool, and apply the solutions carefully to the tip of the tongue with a camel's-hair brush. You will get none but the four tastes mentioned above.

16. Note the contrast of tastes. Brush sweet along one side of the tongue. Then brush salt or acid along the other side; the sweet becomes noticeably sweeter.

(6) Smell.

17. Note the antagonism of smells (*cf.* colours). Make paper funnels, and sniff through them at india-rubber with one nostril, and at beeswax with the other. If the substances are taken in the right proportions, you get no smell at all.

(7) What sensations do you get in the act of yawning? What in that of swallowing? What unusual sensations do you have, from the face, after you have been running hard?

(8) Suppose that you pared off the top of the colour-pyramid, at any given height above the base: what would you see upon the cut surfaces (planes of latitude)? Suppose that you peeled the figure like an onion; what would you see upon the total surface thus exposed? Suppose that you halved the figure longitudinally, cutting from WRB to the axis, and thence on to WGB: what would you see upon the cut surfaces?—Should the base of the double pyramid lie in its present plane, or should it be tilted? In which direction? Can you suggest any other modifications?

(9) Work out the anatomy and physiology of the organ of giddiness (§ 18, *b*) in greater detail. (*F.*, pp. 729 ff.)

(10) To test Weber's law, take two small weights which, when laid successively on the palm of the hand, exert clearly different pressures. Now double the lighter weight, and find by repeated trial how heavy a fourth weight must be,

if it is to differ as much in sensation from the double weight as the heavier of the first pair differed from the lighter. — You can make the weights of coarse shot, tied in little chamois leather bags; and you can take a single shot as unit of weight, without actually weighing the bags.

Or proceed in this way. Take two glass funnels, of equal weight; two largish bags of shot, of equal weight; and a number of very small bags, also of equal weight. One funnel is weighted only with a large bag; this gives the standard weight, *a*. The other is weighted with a large bag, and with one or more of the small bags, as the experiment requires; this is the variable weight, *b*. Find by repeated trials what weight *b* must have if it is to be just noticeably heavier than *a* in sensation. Lift the funnels successively in each experiment, raising them to a marked height above the table. Keep the arm very steady, bending only at the elbow joint; avoid any shifting of the weight in the hand. Estimate the weights on the basis of a double (up and down) movement. Having made *b* just noticeably heavier than *a*, take *b* as your standard, and add to *a* till it is just noticeably heavier than *b*; then reverse the procedure again, and so on.

If we represent the first standard by 1, the series obtained will be approximately: $1, \frac{31}{30}, \frac{961}{900}, \frac{29791}{27000}$, etc. When sensations are just noticeably different in intensity, their stimuli differ by the same relative amount in each case. For lifted weights (strain sensations) this constant relative difference is about one-thirtieth. Hence we have the series:

$$1,\ 1 + \tfrac{1}{30} \text{ of } 1,\ \tfrac{31}{30} + \tfrac{1}{30} \text{ of } \tfrac{31}{30},\ \tfrac{961}{900} + \tfrac{1}{30} \text{ of } \tfrac{961}{900}, \text{ etc.}$$

References

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Sully, *Human Mind*, vol. I., pp. 81–132.
Titchener, *Outline*, §§ 7, 8, 11–30.
Wundt, *Lectures*, Lects. II.–VII.
Wundt, *Outlines*, §§ 5, 6.
See also: E. C. Sanford, *A Course in Experimental Psychology*, 1898.

CHAPTER IV

Affection and Feeling

§ 24. **The Two Kinds of Affection.** — We not only *sense* stimuli; we also *feel* or *are affected by* them. We say, "How delightfully cool it is here!" and "What a delicious fragrance this flower has!" and "You must have had a very unpleasant conversation!" The coolness and fragrance and conversation are all made up of sensations; but the delight and pleasantness and disagreeableness are affective processes.

Life is a balance of opposing forces

Let us see, now, what affection is. We know that there are two opposite processes always going on in the body: processes of decay, and processes of renewal. We all tend to decay, to die; but we eat and drink and sleep, and so renew our strength for living. Life, then, means that the body is holding its own against the forces that would destroy it; living means a balance between the building-up and the pulling-down processes.

and the predominance of either force at a given moment is indicated by an *affection*.

Think of the living body as a lump of jelly, standing on its base, but not standing very firmly. All over the surface of the lump are little dents or pits. These represent the sense-organs, the channels by which the things and processes of the outside world gain access to consciousness. Every time that a stimulus forces its way into one of the dents, the *whole lump* is tilted, — tilted towards a position of greater or less steadiness. The conscious processes that accompany this tilt are *affections*. If the tilt is for the good of the lump, the affection is *pleasantness;* if for its harm, *unpleasantness*.

If the organism is balanced as at *a* of the Figure, a stimulus coming in the direction of the arrow will tend to overthrow it, *i.e.*, will be unpleasant. If the organism is balanced as in *b*, the stimulus will tend to restore its equilibrium, *i.e.*, will be pleasant.

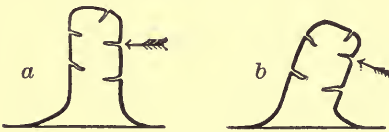

FIG. 8

Do not confuse this 'equilibrium' with that of § 18. There we were talking of the actual balance of the body in space; of our standing upright or staggering and falling. Here we mean by 'equilibrium' the balance of growth and decay, of waste and renewal, that the living body shows us.

Do not think, either, that every stimulus is a life-and-death matter. Many stimuli that are sensed are not felt at all; the tilt is too slight.

And lastly, do not suppose that everything which is pleasant to *you*, under your particular circumstances, is good for you. Nature strikes averages; she does not look after the individual. Pleasant things are good on the average, — good for the perfectly healthy, adult animal, living under natural conditions. Man is a domesticated animal, living like sheep and oxen under artificial conditions; and there are many things pleasant to particular men which are not for their good, do not conduce to their upbuilding. Nevertheless, the rule holds as a rule of averages. *On the whole*, what is pleasant is for the advantage of the organism.

Definition of affection.

Affection, then, is an elementary conscious process which may be set up by the stimulation of *any* bodily organ. And while we find some 50,000 different sensations, we find only two different affections.

Definition of feeling.

§ 25. **Feeling.** — No affection, or mixture of affections, ever appears in consciousness alone. Affection always comes with the stimulation of *some* organ, and consequently always comes together with the *sensation* from some organ. When we have in consciousness a complex process made up of sensation and pleasantness or unpleasantness, — and when the affective side of the process, its pleasantness or unpleasantness, strikes us more forcibly than the sense-side of it, — we call the total process a *feeling*.

Some sensations enter into feelings more readily than others.

It is clear, if we work through the list of sensations, that some of them enter into feelings much more readily than others. Thus (1) black, white and grey are hardly ever very pleasant or unpleasant. We are so familiar with them (in printing and writing, in our clothes, etc.) that they have ceased to affect us. Only when a light is so dazzling that the sensation of pain is set up in the muscles of the eye do we feel it to be unpleasant. The same thing is true, though in slightly less degree, of colours. A simple colour rarely enters into a feeling; we are so constantly surrounded with coloured objects (carpet, wall-paper, pictures, book-covers, clothes, houses, grass, sky, etc.) that we have grown used to colour. (2) Giddiness is never anything but unpleasant. But noise and tone, like brightness and colour, we have always with us (sounds in the house or street, our own and our friends' voices); so that they affect us but little. (3) Sensations from the skin differ among themselves. Pure pressure-feelings are rare; temperature-feelings (oppressive heat, bitter cold) are quite common; while pain, like giddiness, is naturally unpleasant. (4) Tastes and smells affect us so much that we are apt to speak of them simply as 'agreeable' or 'disagreeable,' without troubling to think of their sensation-names. (5) Strain may be pleasant or unpleasant or neither. Hunger and thirst are always either pleasant or unpleasant; nausea is always unpleasant. But most important of all for the arousal of feelings are the stimulations of internal bodily organs that call forth the obscure sensations mentioned in § 21 (3). It is just because these sensations are swamped, so to speak, by pleasantness or unpleasantness that they are so difficult to introspect as sensations.

Remember that we are speaking now of sensations, and not of perceptions or ideas, which are groups of sensations. We get some of our keenest pleasures from sights and sounds, — from beautiful paintings and statues, or from music, — but these pleasures come from mixtures or groups of colours and tones, not from simple sensations.

Oftentimes the pleasantness of a perception outweighs the unpleasantness of a sensation. Thus children will twirl round and round, from pleasure in rhythmical movement (perception), although they know that the giddiness (sensation) which will follow the twirling cannot be anything but unpleasant.

The law of feeling.

Summing up, then, we may say that the sensations which tell us most about the world outside the body (those of sight and hearing) are least likely to enter into feelings, while the sensations that tell us least about such outside matters (those from the internal bodily organs) hardly ever come to consciousness except as parts of feelings.

Different meanings of the word 'feeling.'

The word 'feeling' is used in ordinary language to mean several different processes. It will be well, for the sake of clearness in our thinking, to distinguish these.

(1) Feeling is used for the *perception of touch* (§§ 46, 51). We say that a thing 'feels hard,' and we 'feel in our pocket' for something.

(2) It is used for certain internal *sensations*, whether they are strongly tinged by affection or not. Thus we 'feel hungry' and 'feel thirsty,' although the hunger and thirst may be neither strongly pleasant nor strongly unpleasant.

(3) It is used for some very complicated affective processes, for *emotions* and *moods* (§ 58). Thus we 'feel angry' or 'feel blue.' Anger is an emotion; 'the blues' is a mood.

(4) It is used, as by us here, for a mixture of affection and sensation in which the affection is the stronger of the two processes. Thus it is correct to say that we 'feel cramped,' or 'suffocated,' or 'well,' or 'fresh,' or 'drowsy': all these processes are made up of internal sensations and affection, and the affection dominates the whole process. It may or may not be correct to say that we 'feel' hot or cold, hungry or thirsty; it all depends on whether we are thinking of the sensations or their accompanying affections. If we 'feel bitterly cold,' or 'jolly hungry,' the process is a true feeling.

The feeling of drowsiness analysed.

Let us introspect a true feeling, — say, the feeling of drowsiness, — and convince ourselves that it is made up of sensation and affection. Drowsiness begins, on the sensation side, with a sensation of pressure on the upper eyelids, with a tickling in the throat that leads to yawning and so brings a complex of muscular sensations, and with a sensation of pressure at the back of the neck (the head droops). The lids grow constantly heavier; breathing gets slower and deeper, so that its sensations change; the lower jaw becomes heavy, so that the mouth opens and the chin falls forward on the breast (pressure sensations); the neck sensations become stronger, the head heavier; and lastly the limbs grow heavy, and arrange themselves by their own weight. Sensations of temperature come from the surface of the skin, thrills of warmth running their course at different parts of limbs and trunk. Over all this mass of sensation is spread an affection; an easy, comfortable pleasantness. And the affection outweighs the sensation; we know better that we 'feel comfortable' than that sensations are coming in from this or that organ. — The total process, then, has all the marks of a true feeling.

Mental processes have bodily expressions.

§ 26. **The Bodily Signs of Affection.** — Every mental process has some way of expressing itself through the body; or, in other words, there is always some bodily sign or indication which tells us, if we are good observers, that a certain mental process is in our neighbour's consciousness. Sensations and ideas show themselves by movements, the commonest of which is the movement of speech. For speaking, on its physiological side, is a series of movements; the movements of the muscles of the larynx regulate the passage of air through the slit formed by the vocal cords. Affective processes also show themselves by movements, and more especially (as we shall see later, § 61) by movements of the muscles of the face: we 'look' pleased or angry, grieved or frightened.

But affection, as we saw, corresponds in consciousness to a tilt of the *whole* body. We shall therefore expect to find that the whole body gives evidence of the presence of affection in consciousness. Not only will there be particular movements, a particular 'play of feature' or what not, to tell us that affection is there; we must be able to read off from the whole body whether the mind is pleasantly or unpleasantly disposed.

The four bodily signs of affection:

Experiment has shown that this is actually the case. We have no less than four ways of knowing, by the general behaviour of the body, which of the two affective processes is tingeing the consciousness of the moment. We know it (1) by the state of the pulse; (2) by the state of breathing; (3) by the size of the body; and (4) by the amount of muscular strength that can be exerted.

(1) When we are pleased, the pulse is strong; when we are displeased, weak. (2) The same thing holds of breathing. If an experience is pleasant, we breathe more deeply; if unpleasant, less deeply. In joy, we breathe in great breaths; in sorrow, our breathing is short and weak. (3) When we are pleased, the blood flows freely into the little blood-vessels that lie just beneath the skin; when we are displeased, it is withdrawn to the internal organs of the body. Hence we are really larger, we 'expand,' in pleasure, and 'shrink into ourselves' during an unpleasant experience. (4) When we are pleased we are stronger muscularly, we can put out more strength, than when we are displeased. We 'feel stronger' and are stronger than usual when we are heartily and justly angry (pleasant anger). Grief bows us down, crushes us, leaves us physically weaker than we were.

pulse, breathing, volume, strength.

If we wish to measure these bodily changes accurately, we must use complicated scientific instruments. But we can all assure ourselves, from our everyday experience, that they take place. And it is interesting to note, further, that a good novelist refers to them, when he is describing the signs of feeling in his characters. Turn, *e.g.*, to *David Copperfield.* You will find the following sentence in ch. xxviii.: "As the step approached, I knew it, and felt my heart beat high." Dickens has noticed that the heart-beat is stronger than usual when one is greatly pleased. In ch. lii. we have: "He looked at us attentively, with his whole face breathing short and quick in every feature." The sentence is meant to describe a man's appearance when he is under the influence of rage and fear: there is a similar passage in ch. xiv. Again: in ch. xxxvi. it is said that Mr. Micawber "walked so erect on the strength of this virtuous action, that his chest looked half as broad again when he lighted us downstairs." If Mr. Micawber's arm or leg had been measured, his virtuous pleasure would have been found to carry with it an actual expansion of that part of him also. Lastly, when Miss Mowcher captures the respectable Littimer in ch. lxi., "she'd have took him single-handed if he had been Samson,"— so strong was she in her righteous indignation. And there is a similar remark in ch. vii.

It is, of course, only through *introspection* that we are able to bring these bodily changes into connection with the mental processes of affection. We first observe the connection in our own case, and then have the right to argue from the same bodily sign to the same mental process in the case of others. It will, perhaps, make the task of introspection easier if we note now some of the chief differences between sensation and affection, as elements of consciousness.

The differences between sensation and affection:

§ 27. **Affection and Sensation.** — The best way to realise the great difference between sense-experience and feel-experience is just to sense and to feel. But it will help us to sense and feel *observantly* if we put down in words some of the differences between the two kinds of experience. We cannot put them all down here; we have not travelled far enough into psychology. There are three of them, however, that we are now in a position to understand.

(1) only one affection can be present at any given time;

(1) A sensation is set up by the stimulation of a particular organ; an affection by the tilt given to the whole body through that stimulation. Suppose now that (as always happens in actual experience) two or three sense-organs are stimulated together; there will be a *group* of sensations in consciousness at the same time. Every stimulus is represented by its own special sensation; the sensations run peaceably side by side. But the body as a whole cannot be tilted *both* up *and* down at the same time; either

the tilt-up will be the stronger, or the tilt-down, or the two will counterbalance each other and there will be no tilt. This means that the two opposite affections cannot ever be in consciousness together. The combination of stimuli which has called out the group of sensations will be either pleasant as a whole, or unpleasant as a whole, or neither: it cannot possibly be both. — In other words: a consciousness may be made up of all sorts of sensations, sights and sounds and tastes and organic sensations; but the affection of that consciousness is a single affection, a pleasantness or unpleasantness which spreads over the total stream of sense-processes, and makes it as a whole pleasant or unpleasant.

There is a reference to this law in the *Pickwick Papers*. "A good, contented, well-breakfasted juryman," says Mr. Perker (ch. xxxiv.), "is a capital thing to get hold of. Discontented or hungry jurymen always find for the plaintiff." That is to say: if your mood is pleasurable, if you are comfortable and experiencing the pleasant feelings of satiety and easy digestion, you tend to see everything in a favourable light; if your mood is unpleasurable, and you are uncomfortable and hungry, you are likely to take the worst possible view of your fellow-creatures' actions. The affection of the moment is spread over the whole of consciousness.

Cf. Shakespeare, *Sonnets*, viii., xcviii. — For a discussion of 'mixed feelings,' see § 65.

(2) We are inclined, until we know better, to think of sensations as something physical. Many of the readers of the previous Chapters were, probably, surprised to find that colours and temperatures were dealt with by psychology; they had thought that it was the *sky* that is blue, the *air* or *water* that is hot or cold. Not till we have fully grasped the differ- **(2) affection is subjective;**

ence between the physics of light (ether-waves), the physiology of light (stimulations and excitations in eye and cortex), and the psychology of light (sensations of brightness and colour), can we understand that 'blue' is a mental process rather than a physical fact.

But we never think of affections in this way. When we talk of 'a piece of unpleasant news,' we do not think of the unpleasantness as being where the news is, in the letter or newspaper; we mean 'news that makes *us* uncomfortable,' 'a piece of unpleasant-to-us news.' When we tell a friend that a certain book is 'interesting,' we mean that it pleased us and will please him; the interest is not between the covers of the book, but is aroused in our minds by the book. All our feelings are, so to say, *personal* matters, belonging simply and solely to ourselves; we never have any inclination to look at them as physical facts, outside of us.

This difference between sensation and affection is sometimes expressed by the terms 'objective' and 'subjective.' Both are mental processes; but sensation is an objective, affection a subjective mental process. Sensations stand for outside things and processes; my sensation of blue *means* the sky, to me; a sensation of pressure *means* my book or my cup and saucer. Affections have no such reference to external objects; they are purely passive and (in this sense) unmeaning processes. Hence they are more personal tc me than sensations are.—We can, of course, form an *idea* of affection (§ 5): otherwise the preceding paragraphs could not have been written. And the idea of affection has meaning; it means a generally good or a generally bad state of my bodily functions. But this is a different matter.

In popular thinking, the body is conceived of as subjective, and only the world outside the body as objective (*cf.* § 93). The sensation of pain, *e.g.*, is often identified with the affection of unpleasantness. If we wish to see pain and the other sensations from the internal bodily organs in their true psychological character as sensations, we must look at the portion of the body in which they arise as if it were something apart from us, like the sky or a chair or a sound. In this way we are able to introspect aright; to split up the total feeling, and to rid the organic sensations of the personal or subjective flavour of the affective processes.

(3) affection is blunted by repetition.

(3) If a stimulus is repeated over and over again, the sensation aroused becomes more and more organic to our minds, until it grows to be an indispensable constituent of certain consciousnesses; but the affection set up grows weaker and weaker, until at last it disappears altogether. The usefulness of this difference is clear. We have to live in certain surroundings, to work out our lives under certain external conditions. We must, then, become wholly familiar with these surroundings; we must 'know our way about' them, without having to waste time by re-learning them from day to day. In other words, the sensations which we get from them must become ingrained in our conscious make-up. But it would never do for us to be perpetually *affected* by our surroundings; we should be worn out with trifles, and unfit for serious work. It is therefore a very useful property of the nervous system that it can adapt or adjust itself, within certain limits, to its surroundings; that it can become 'set,' as it were, at a certain slight tilt, so as to meet the tilt in the other direction given it by familiar stimuli.

Think how vexed you are when you lose some little thing; how sorry you are when you break something; how pleased you are when something is given you. But think, too, how seriously your life would be interfered with if you felt the same feeling over again every time that you thought of the loss, every time that you thought of the broken cup, every time that you saw the gift on your table. Life would be a constant seesaw of feeling; one would never find opportunity to 'settle down' to anything, and there would be no spur to press on towards new enjoyments.

Think, too, how much time would be wasted if you had to find your way about your home and native town just as if they were always a strange house and a new town. Familiarity has organised the ideas of home and town into the structure of your mind; you take them for granted.

Here, then, is a great difference, and a very useful difference, between sensation and affection. It you find that one part of a concrete process becomes more serviceable, is (so to say) more easily handled, while another part fades out, with repetition, you may be sure that the first part is the sense-side and the second the feel-side of the process.—*Cf.* Shakespeare, *Sonnets*, lii., lvi.

We cannot enter here into the question of the *bodily conditions* of affection; we must wait till we have discussed the state of *attention*, to which affection is very closely related. Before we go on to deal with attention, however, we must notice that some psychologists give a very different account of affection from that given above. It is only fair that we should see what their account is; and it will be well to try to find out why they differ from us.

§ 28. **Are there More than Two Kinds of Affection?**—We have recognised two, and only two, kinds or qualities of affection: pleasantness and unpleasantness. This means (to quote Professor Wundt) that "the unpleasurableness of a toothache, of an intellectual failure, and of a tragical experience is identical." In so far as they are *unpleasant* experiences, the toothache-, failure- and tragedy-consciousnesses are the same.

Professor Wundt looks upon this as "an entirely untenable assertion." "The variety of simple affective qualities," he says, "is exceedingly great, much greater than that of sensations." That is, mind is made up not of some 50,000 sensations and two affections, — but of some 50,000 sensations and a great many more than 50,000 affections. Here is a radical difference of opinion!

Wundt's six classes of affective processes.

Professor Wundt confesses that we cannot name all these affections. But he thinks that we can distinguish six great groups of elementary affective processes. These are (1) pleasantness and unpleasantness, (2) strain and relaxation, and (3) excitement and depression. Just as there are a large number of 'smells' and 'colours' and 'sounds,' so there are a large number of different affections under each of these six heads.

Which is the right view? Nobody can say; the matter must be decided by long-continued and careful introspection. But, supposing our own view to be right, can we say how the other view could have arisen? Yes: that question can be answered. The other view might easily arise from the confusion of feeling and affection, *i.e.*, of specific and elementary processes.

'Elementary' and 'specific' processes.

The reader knows what is meant in psychology by an *elementary* process; it is a process which cannot be split up into simpler processes by introspection. Now the *specific* character of a process is different from elementariness, but may readily be confused with elementariness. It is what makes one concrete process different from another concrete process that is composed of the same elements. Thus all the emotions (fear, hate, joy, hope) are made up of the same material : perceptions and ideas, organic sensations, and affection. But no one would ever take a hate for a fear, or a hope for a joy ; these emotions are specifically different. Again : all ideas are made up of sensations ; but the idea of a table and the idea of a desk could not be mistaken for each other. And again : all feelings are made up (on our view) of sensations and affection ; but the feeling of drowsiness is specifically different from the feeling of suffocation.

Suppose, however, that we were to look upon the feelings as elementary processes, — to confuse the specific character of a concrete process with the elementariness of affection. Then we should get Professor Wundt's view : the view that there are more affections than there are sensations. For every sensation, at every possible degree of intensity, can (on our view) enter into a feeling ; though some do this more readily than others. Hence if every feeling is taken to be an elementary affective process, there must be more affections than sensation qualities.

This is the confusion which Professor Wundt seems to have fallen into. The terms 'strain' and 'relaxation' distinctly suggest sensations ; the sensations of tendinous strain, and the pressure sensations from skin and muscle (sensations of 'heaviness') that appear in the feelings of drowsiness, tiredness, etc. And it is not surprising that one should fall into it, seeing how closely many sensations (organic sensations, tastes, smells) blend with affection, and how difficult it is to get at the really elementary factors even by the most patient introspection. But it is a good rule not to accept a process as elementary which holds out any prospect whatsoever of being compound. Hence while we admit that the feelings are specifically different (as different as the 'wish' for an apple and the 'wish' for a relief from pain), we cannot regard them as elementary. Pleasantness and unpleasantness seem to be the sole affective processes.

Questions and Exercises

(1) Cut small squares of coloured paper: say, 7 standard colours, 7 shades of these (darker colours), and 7 tints (lighter colours). Add to the 21 colours 7 brightnesses: black, white and 5 intermediate greys. Sort the squares into pairs; pairing every colour and brightness with every other colour and brightness. Show these pairs, in random order, to the observer, and let him say which is the *more pleasant* of the two impressions. At the end of the experiment, make out a full list of the 28 qualities, arranging them in the order of greater to less pleasantness.

Notice (*a*) that the results got from different observers are very different. This shows how little accustomed we are to find simple colours and brightnesses pleasant or unpleasant.

(*b*) The pleasantness may arise in two ways. It may come directly, at sight of the square, from the stimulus itself; or it may come indirectly, by 'association,' — the colour 'suggesting' something of that colour (a blue gown, a red house, a yellow necktie, etc.) which has played a part, pleasant or unpleasant, in the observer's experience.

What you are trying to find here is the *direct* value of the different stimuli in calling up an affective process. You must therefore rule out association, as far as you can. As the observer gets practised in the experiments, the associations will become fewer and fewer.

(2) Seat the observer before a table. Drive a nail partly into the wood, at his right hand. Measure off 25 cm. along the table's edge, from this nail towards the observer's right. Lay a book at the 25 cm. mark. Now (*a*) let the observer move his finger slowly along the table, from the nail to the book. Then (*b*) remove the book, and let him try to make the same movement, stopping when he thinks he has reached the point at which the book lay. Do this a number of times, and take the average of the second movements.

Repeat the series, with this difference: before the observer makes the second movement in each experiment (the movement when the book is removed) let him smell a pleasant or unpleasant odour. Notice how his average movement is lengthened or shortened under the influence of pleasantness and unpleasantness.

(3) If you possess a hand-dynamometer (Fig. 9), take with it (*a*) the strongest squeeze that the subject can make under ordi-

nary circumstances; (*b*) the strongest that he can make while tasting a very bitter substance; and (*c*) the strongest that he can make while tasting a pleasantly sweet substance.

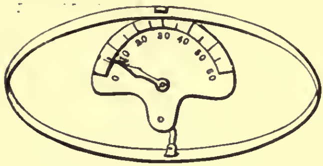

Fig. 9

(4) Analyse by introspection the feelings of smart (a 'smarting pain'), of health ('I feel first-rate'), of hunger and of oppressive heat.

(5) Write out a list of all the 'feelings' you can think of, — that is, of all the phrases beginning with "I feel" or "I have a feeling of." Find by introspection how many of them really contain the element of affection, and how many are merely sensations or perceptions.

(6) Give in your own words the distinction between elementariness and specific difference. Try to find instances of it in some other science, — *e.g.*, in chemistry.

(7) Give instances, from your personal experience or from novels, of the three differences between affection and sensation mentioned in § 27.

(8) We may receive much pleasure from the sight of an expanse of blue water, of the starry sky, etc., or from the sound of a friend's voice. Can you reconcile this fact with the statements of § 25?

(9) All the bodily changes mentioned in § 26 reduce to a single type when strictly analysed. What is the type?

References

Sully, *Human Mind*, vol. I., pp. 64–66; vol. II., pp. 1–56.
Titchener, *Outline*, §§ 31–34, 56.
Wundt, *Lectures*, Lect. XIV.
Wundt, *Outlines*, § 7.

CHAPTER V

ATTENTION

§ 29. **The Problem of Attention.** — We have defined mind as the sum of all those mental processes that make up the experience of a single lifetime. And we have seen that mental processes, when introspectively scrutinised and dissected, can be reduced to two kinds of quite simple processes or mental elements, sensation and affection. Every consciousness can be split up into certain groups of sensations and a certain affection.

If, now, these processes always remained unchanged, if the stream flowed always at the same level, the task of the psychologist would be easy. He would take the consciousness which he wished to examine, and pull it to pieces by introspection; then he would state the laws which had led to the grouping of the elementary processes into that consciousness; and then he would describe the bodily processes corresponding to the mental processes which he had found. But (as we saw in § 8) the processes do *not* remain unchanged. The stream of consciousness is sometimes a mere trickle, sometimes a placid river, sometimes a torrent: or, in technical language, there are many different *states* of consciousness. The mental processes may remain the same processes, as we pass from one state of consciousness to another; but their state — their relative prominence or importance — is changed. **States of consciousness:**

attention and inattention.

The states of consciousness that are most familiar to us in the waking life are those of attention and inattention. The value of attention need hardly be pointed out; every teacher and every learner admits it. The reader may, however, be reminded that the rule "Be attentive" occurs in our list of the general rules of experimental introspection (§ 15). It will be well, then, now that we have discussed the elementary mental processes, to look at *attention*, and see how these processes behave in the attentive and inattentive states, before we pass on to treat of the laws which govern their union in perceptions and ideas and emotions.

The two sides of attention.

Attention, like the tree in Mark Twain's story, has two sides, an inside and an outside. Looked at from the inside, attention consists of a certain well-marked phase or aspect of the stream of consciousness: our mental processes when we are attentive are in a different state from our mental processes when we are not attending. Looked at from the outside, attention consists of a certain attitude of the body, and especially of the head. The problem that attention sets us is, therefore, twofold: we must describe and explain the state of consciousness, and we must describe and explain the bodily attitude.

We shall see later (§ 34) that even this outside is in a sense an inside; that it has a distinct psychological value. The bodily attitude is in many cases accompanied by intensive and characteristic sensations.

§ 30. **Attention as a State of Consciousness.** — We have here to ask what attention is, as a psychological fact, — how the state of attention differs, when introspectively examined, from the state of inattention.

When we are inattentive, — when we are in a reverie, letting our thoughts wander, — the stream of conscious processes is flowing, so to speak, at the same level. Every idea that occurs to us is as important as, but not more important than, the ideas already present. There is no difference in the height of the waves, as the stream of consciousness flows on.

Attention *to* and attention *from*.

When we are attentive, on the other hand, the stream flows at two distinct levels. The one is the level of the ideas attended *to;* the other that of the ideas attended *from*. For we cannot attend at the same moment to all the ideas that make up a consciousness; the 'grasp' of attention is limited, — so that some ideas must suffer for the benefit of the rest. The ideas attended *to* are assisted in their course: their waves run at a great height above the average level of the stream. The other ideas in consciousness, those attended *from*, are checked: their waves run sluggishly below the average level.

In Fig. 10, *a* represents an inattentive, and *b* an attentive consciousness. The dark line is the bed of the stream, and the current is supposed to be flowing towards you, out of the paper. In *a* there are five ideas present, all proceeding at equal levels. In *b* the third idea is being attended to; its wave is much heightened, while the waves of 1, 2, 4 and 5, the ideas attended from, are depressed.

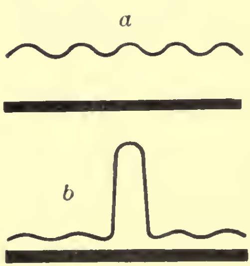

FIG. 10

The heightening of the wave which represents the idea attended to means three things. (1) This idea

The character of ideas attended *to*.

becomes *clearer* in consciousness than the other ideas of the time; it stands out definitely and distinctly, while the ideas attended from are blurred and obscure. (2) It *lasts longer* than the other ideas. They slip away, but it is 'held' or arrested. (3) It is *more valuable* than the others. For it is more 'suggestive' than they are, — it brings to mind a number of other ideas; and it is also more likely to be remembered than they are, so that it will be at our disposal on future occasions when they have altogether disappeared from memory.

You can easily verify these three points by introspection.

Attention may be

§ 31. **The Three Forms of Attention.** — If we look at attention in the adult mind, we find that it appears in three different stages or strata; and each of these represents a stage in the development of mind at large, in mental evolution. These stages have been named passive attention, active attention and secondary passive attention. We must look at them in order.

passive,

(1) *Passive Attention.* — There are some things that we *must* attend to, whether we will or no; things that irresistibly attract us to them, whatever our occupation at the time may be. Such are loud sounds and brilliant lights; things that move amidst unmoved surroundings; things that for some reason contrast with their surroundings. When an object of this kind is presented to us, we necessarily attend to it; its idea is borne up in consciousness on the crest of the attention wave, and we are deaf and blind to other stimuli.

active,

(2) *Active Attention.* — Sometimes, on the other hand, we seem to be holding our mind upon an

object by main force, to be making ourselves attend. The ideas attended to in these cases are not such as would 'naturally' become the prominent ideas in consciousness: indeed, they may be ideas which would naturally escape notice. Thus we may listen intently to a very faint sound, a sound that under ordinary circumstances would have had no power whatsoever to attract the attention; or we may note the minute differences between two shells or two plants, finding distinctions where the ordinary uninterested observer would find nothing but similarity. This active attention always involves effort.

or secondary passive attention.

(3) *Secondary Passive Attention.* — Active attention, however, may pass over into passive. The man of science who is comparing the shells or plants may become so absorbed in his work that he forgets his dinner or misses an appointment; his mind is held as firmly by his work as it could be by a loud sound or a movement. In such a case, an object which has no right of its own to engross consciousness has gained this right in course of time and practice. At first attended to actively, with an effort, and barely able to hold its own against distracting ideas, it now absorbs the full measure of attention; the student is buried or sunk in his task.

The attention of young children and of the lower animals is almost exclusively of the passive sort. Older children and the higher animals are capable of active attention. Secondary passive attention is peculiar to man and to the animals trained by man (dogs, performing animals). Man alone is able to make full use of it. We must now ask what that use is, and what is the significance of the three stages of attention in our mental life.

Individuals differ

§ 32. **Bodily Tendency and Mental Constitution.** — Every child is born with certain aptitudes. Its mind will not be an all-round mind, but a mind better suited to some one career, some particular employment, than to others. The reason is that every child is the outcome of different conditions. The children of different families come of different stocks, so that their inherited tendencies or leanings are different; and even brothers and sisters have different natural endowments, according as they 'take after' this or that parent or grandparent, and are brought up under different circumstances.

in bodily tendency

Biologically regarded, these differences are differences of *tendency*. The nervous system of each one of us is the product of a long course of development, during which all sorts of influences have been at work to shape and mould it. It is set for acting in a certain way, and cannot act satisfactorily in other ways. Psychologically regarded, the differences are differences of *mental constitution*. Each man's mind is differently constituted from his neighbour's, because its processes run their course within the channels laid down by a particular nervous system. With certain nervous tendencies we have a 'mathematical mind'; with certain others, an 'emotional mind'; with certain others, a 'plodding mind'; etc.

or mental constitution.

How we know this.

The fact that minds differ in general trend or character is brought home to us in three ways. (1) If we compare the results gained by introspection of different minds, we find curious individual differences. One man remembers an event by seeing it over again; another by hearing it over again. That is, the one is eye-minded, the other ear-minded. It is the same event; but it has appealed to the two minds differently, because of the differences of nervous tendency. The minds are differently constituted. (2) We are sorted out into groups as children; we are told that we are 'bright' or 'dull,' 'industrious' or 'impatient,' etc. So it is natural to us to think of minds as being of different types or kinds. (3) We see that different people act differently under the same circumstances. One man is confused and hesitant, another stunned and helpless, another ready and capable, while the external conditions remain precisely the same.

The problem of education.

We have said that nervous tendency and the mental constitution that corresponds to it are the result of influences which have been at work throughout a long course of development, — of the influences that affected parents and grandparents and more remote ancestors. That our surroundings can and do exert a profound influence on us is a fact, however, that each of us can observe in his own lifetime. The child's nervous system, though set in a certain way, can yet be moulded to a very considerable extent; the habit imposed by education becomes second nature. This, indeed, is the chief problem of education. In psychological language, the teacher must find out the child's *natural* mental constitution, noticing the good and bad features of it, and must seek by influence of all kinds to accentuate the good and minimise the bad. In biological language, he must find out the child's *natural* nervous tendencies, and strive — by favouring the formation of good habits — to keep the right channels open for the flow of mental processes and dam up those that lead mind astray. Natural constitution and natural tendency must be partly reinforced and partly checked by *acquired* constitution and *acquired* tendency.

Bodily tendencies account for the forms of attention;

The existence of nervous tendency is the key to the three forms of attention. (1) The natural conditions of life are so far alike that every animal must have certain tendencies, if it is to live at all. An animal that neglected loud sounds, that did not notice movement in its neighbourhood or change in

passive,

its customary surroundings, would soon fall a prey to its enemies. Hence passive attention to these things is ingrained in our physical structure; a mind so constituted as not to attend to them is an impossibility, the conditions of life and evolution being what they are. (2) But the list of things that we must attend to is not very long. And things not in the list cannot, of course, attract the attention so forcibly, cannot demand it so imperatively, as the others can. Hence attention to them is active attention: attention under difficulties, attention with several claimants upon consciousness. The strongest idea wins, *i.e.*, the idea that takes most easily the direction of our nervous tendencies; but it wins only after a struggle with other ideas, which follow the lines laid down by weaker rival tendencies. The nervous system is so complicated that it may be the scene of many conflicting tendencies at the same moment. (3) At this stage the development of the animal mind ceases. The animal (unless dominated by man, formed by human training) must go through the same struggle, make the same effort, every time that it is attentive. But man is superior to the animals in that he has a conscious tradition, a history: he has records of the past, in the light of which he can look forward to the future. Hence man is able to 'take sides' with the ideas that are striving for the first place in consciousness; he can help one idea, and hinder others. Partly we do this for ourselves, thinking that "this work is a great nuisance now, but will be worth while in the long run"; partly, and more especially, it is done for us by parents and teachers,

active,

and secondary passive attention.

whether we consent or not, while we are children. The child is trained, in the light of the past experience of the human race; the young of animals have no such training. So we get, in man, the state of secondary passive attention. A task at first performed against our will, with pains and difficulty, becomes easy and natural.

The conditions of intellectual progress.

Secondary passive attention is the chief condition of human progress. The more a piece of work is reduced to a matter of course, the more power has the mind to advance to further work. This becomes natural and easy in its turn, and gives place to new work; and so on. And secondary passive attention is possible because the teacher, guided by past experience, can lay his finger upon a useful tendency, a useful feature of mental constitution, in the child, and aid it by insisting on the formation of habits in accordance with it. Active attention thus appears as a stage of waste, a stage to be got out of. At the same time, it is a stage that must be passed through, and passed through again and again, if knowledge is to grow and character to be rightly moulded. The child who did not pass through it would remain at the level of the animals, the sport and play of any great or striking or novel occurrence in its surroundings. Active attention is the battle which must be won by those who mean to master their surroundings and rise to man's full height above the animal world.

§ 33. **Attention and Affection.** — If the reader had been asked, before he opened this book, why he attended to certain things, he would probably have replied, "Because they interest me." If he were asked now, after having read the previous Section, he would probably say, "Because they are the things that follow the lines of my nervous tendencies, or fit in with my mental constitution." Both answers are correct, though they are given from different points of view.

Interest.

What is a thing that 'interests' us? It is a thing the idea of which is overlaid with affection. The affection may be pleasantness or unpleasantness. We are interested in what we like, in what pleases us; and we are interested in what we dislike, in what displeases or threatens us, — we are 'fascinated' by accounts of crimes and disasters. It is quite true to say that the interesting thing is the thing that attracts the attention; just as it is quite true to say that the thing which fits in with our mental constitution is the thing that attracts the attention.

Attention and affection back and front of the same state.

But here we must be on our guard against a common error. We are apt to think that we attend to a thing *after* we have found it interesting: that the pleasure or disgust comes first, and the attention follows, drawn to the thing by its interestingness. That is not true. Affection and attention come together in consciousness; they are back and front, obverse and reverse, of the same state. It is only when we are feeling that we are attending; only when we are attending that we are feeling. We do not first feel, and then attend; we feel and attend together.

Now, then, we can see in what sense the two answers to our question are correct. A thing which follows the lines of our nervous tendencies is a thing-to-be-attended-to; at the same time, it is a thing-to-be-felt. But a felt thing is an interesting thing. Hence the thing that we attend to is from one point of view a thing that follows the lines of our tendencies, and from another point of view a thing that interests us.

Two introspective resemblances between attention and affection.

The notion that we attend *after* we have felt interested is so wide-spread, and seems so natural, that the reader may find it hard to adopt the true view, and to think of affection and attention as two sides of the same mental experience. Let us see, then, what introspection has to say of their resemblance. If it turns out that they have certain essential characteristics in common, it will be easier to believe that, when the one appears, the other appears with it.

(1) We saw in § 27 (1) that affection spreads over the whole of consciousness, thus differing from sensations, many of which may run their course side by side at a given time. Attention, in the same way, is a state of the whole consciousness. All the ideas present are influenced by it, by way of exaltation or depression, — some attended to, some attended from.

(2) When we attend to a sensation, we make it clearer, more lasting, etc. We cannot attend to an affection. If we try to do so, we drive the affection away; the pleasantness or unpleasantness disappears, and we find ourselves looking at some obtrusive sensation or idea which we had no intention of observing. The reason is clear: attention and affection are not separate matters, but two sides of one experience, and it is as impossible to attend to affection as it would be to see the 'head' side of a coin by looking at the 'tail' side. — Note that here is a fourth difference between sensation and affection (§ 27; and *cf.* § 12).

A good illustration of the fact that it is impossible to attend to an affection is given in a paragraph of Mrs. F. H. Burnett's reminiscences. Speaking of her child-life, Mrs. Burnett says:

"'Is this *really* the party?' she [the little girl] would say mentally. And then, to convince herself, to make it real, 'Yes, it is the *Party*. I am at the *Party*. I have my party frock on — they are all dancing. This is the Party.' And yet as she stood and stared, and the gay sashes floated by, she was restlessly conscious of not being quite convinced and satisfied, and of something which was saying, 'Yes — we are all here. It looks real, but somehow it doesn't seem exactly as if it was the *Party*.'

And one does it all one's life. Everybody dances, everybody hears the music, — but was there ever anyone who really went to the Party ?"

That is to say: we cannot feel if we try to introspect our pleasure. Attend to the music and the sashes, and you will enjoy yourself; attend to your enjoyment, and it vanishes.

The 'outside' of attention,

§ 34. **The Bodily Attitude in Attention.** — We now turn to the 'outside' of the attentive state, the bodily attitude which we take up when we are attending. This may be briefly described as the attitude which secures the most favourable conditions for the use of the sense-organ to which the object of attention appeals. There is a brace or tension of the whole body; the muscles are all 'under control.' The head is set firmly on the shoulders, fronting straight forward if the object is a sight, thrust out onesidedly if it is a sound. Breathing is kept as steady as possible in the former case, so that the thing looked at may not be obscured by up and down movements of the head, and as noiseless as possible in the second, so that the sound may not be interfered with by the noises of respiration. If we are listening, too, the eyes are often closed, so that our attention may not be distracted by striking or moving objects in the field of vision.

In the case of passive and secondary passive attention, we 'fall into' this attitude naturally. Our nervous systems have been drilled, whether by the accumulated experiences of the race or in the course of our early education, and we adjust ourselves to the circumstances without difficulty or hesitation. In the case of active attention, where there are two or three ideas (each of them with its own bodily attitude) clamouring to be attended to at the same time, there is a conflict of attitudes as there is of ideas; the adjustment takes place slowly, and is completed only after many checks and hindrances.

It is plain that when a bodily attitude is assumed in this way, slowly and laboriously, a large number of sensations will be set up in skin and muscle, joint and tendon. These sensations are aroused, as a matter of fact, in active attention. Blended together, they make up the experience of *effort* which always accompanies this form of attention. A consciousness in the state of active attention thus differs from consciousnesses in the state of passive and secondary passive attention in that a new concrete process, the experience of effort, is introduced into it, over and above the exaltation and depression of ideas already present.

and its effect upon the 'inside.'

Effort.

That the bodily attitude of attention 'will out,' even under circumstances when it would be well that it should not, is seen from the following passage in Fenimore Cooper's *Last of the Mohicans:*

"But Heyward saw that while to a less instructed eye the Mohican chief appeared to slumber, *his nostrils were expanded, his head was turned a little to one side*, as if to assist the organs of hearing, and that his quick and rapid glances ran incessantly over every object within the power of his vision" (ch. xix.).

§ 35. **Apperception.** — Our nervous tendencies, inherited and acquired, decide what we shall *attend* to, or (in other words) decide when we shall *feel.* Each man picks out a world of his own from the great world around him, and is affected by the events of this private world; and the nature of the little world in which he lives his individual life is determined by his mental constitution. Let us see what this means in a particular instance.

Selective perception

Suppose that you are opening a new number of a magazine, or the daily paper. As you do so, your eye is 'caught' by some word in the column before you: say, by the word *grapnel.* Every one who reads much has probably had this experience of the 'catching' of the eye by some word on the newly turned page. As a rule, however, we go on to our reading, and do not think anything about the matter. Yet it is, to the psychologist, a matter of great interest, as a very little consideration will show.

(1) Our eye has been caught by the word *grapnel.* Turning to the place where we saw it, we may find that the word is really there. The paragraph tells of a shipwreck or some other nautical event, and the term 'grapnel' is used by the writer. In this case we have seen the letters just as they are printed.

Even here, however, our tendencies have been at work. For the word 'grapnel' is not printed more clearly, in blacker ink or larger letters, than the other words of the paragraph. We should not have seen it, and failed to see them, unless we had been biassed, unless the idea of 'grapnel' had somehow fitted in with our mental constitution.

(2) But the word need not be there. Looking carefully down the column we may find nothing nearer to 'grapnel' than the word *grape:* the paragraph is discussing the grape harvest. Then we say: "I must have seen 'grape' and thought of 'grapnel,' because I was so interested last night

(or last week or last month) in that article on anchors. I had anchors in my mind, though I didn't know it when I opened the paper."

(3) But, again, the word 'grape' need not be there. There may be no word in the whole paragraph that is at all like 'grapnel'; no word beginning with *gr.* Then we should say: "That's curious! I must have been so full of the anchor article that I saw 'grapnel' in my imagination and supposed I saw it on the paper. I shall be more careful next time."

(4) And lastly: not only may there be no word like 'grapnel' in the column, but there may have been no article on anchors read lately. Rack our memory as we will, we may be wholly unable to find any reason for our having seen that particular word. Then we should say: "That's *very* curious! Of course, I have always been interested in ships; but why I should have seen 'grapnel' just now, when I wasn't thinking of ships or anything to do with them, passes my comprehension."

and its explanation.

The psychologist will offer a similar explanation of these three facts. In (2) and (3), he will say, the reading of the article on anchors had thrown open certain channels of tendency, the tendency that makes you 'interested in ships.' So you read what is before you not as it really is, but as you see it with your mind turned into these channels (*cf.* §§ 10, 12). You were biassed or prejudiced before you opened the paper. As for the last case, the ship-tendencies were so strong there that no opening of flood-gates was needed. Your mind is set so strongly in one direction that you are likely to see everything through shipping-spectacles. You do not realise that you are biassed: it seems 'natural' to you that ships should be interesting. But it is just because the love of ships is ingrained in your nervous system that your perception in this case is a perception of something which is not there, — that you have interpreted a certain arrangement of black marks which do *not* read 'grapnel' as if they spelled that word.

Apperception. All these four cases are cases of what is called *apperception*. An apperception is a perception whose character is determined, wholly or chiefly, by the peculiar tendencies of a nervous system, rather than by the nature of the thing perceived. Sometimes, as in cases (2) and (3), you can tell by introspection how the channels of tendency have been opened up (by the reading of the article on anchors); sometimes, however, the tendencies are so strong in themselves, and date so far back beyond the limits of your memory, that, while you see their effects (the alteration of perception), you cannot tell what it is that takes your mind in their direction on any particular occasion. And again: while sometimes the tendencies assist perception, as in case (1), at other times they may lead you badly astray in your interpretation of the outside world, as in the three remaining instances.

§ 36. **The Working of Attention.** — The experimental study of attention has given us valuable knowledge as to the way in which the mind works in the attentive state. Two points may be mentioned here.

The duration of attention. (1) We cannot attend to the same thing for any length of time together. The attention-wave rises and falls at short intervals: attention fluctuates. The longest stretch of attention recorded is a stretch of 24 sec., and the average length of attention is no more than 5 or 6 secs. Oftentimes, of course, we seem to be steadily attending for a long period to some one thing (as when we are reading a book, or listening to music); but in reality the topic is continually changing, and the drops and spurts of attention are not noticed as we pass from idea to idea, or from phrase to phrase.

A favourite amusement at country fairs is that of shooting at an egg-shell which dances up and down upon a jet of water. The pressure of the water is variable, so that you never know when the egg will drop and when it will spring up. — You may think of the attention-wave in Fig. 10 as a jet of this kind, and of the idea attended to as the egg-shell. Every half-dozen seconds the jet spurts up, and the idea becomes clear; but the spurt is followed by a drop, in which the idea falls into obscurity again.

The range of attention.

(2) We cannot attend to many things at once. If a page of 'printer's pie,' a page of letters mixed at haphazard, is shown to us for a second or two, we can read only 4 or 5 letters in a single flash of attention. The top of the attention-wave cannot carry more than 4 or 5 simple perceptions at the same time. But — and this is the important thing — we can read 4 or 5 familiar *short words* as easily as we can read the 4 or 5 separate letters. This shows that our reading of short words is done by general impression, by a grasp of the look of the whole word rather than by any method of spelling-out the letters.

It would be impossible for us to read as quickly as we do if we read by letters. If I am reading a work on the fauna of Australia, and the word *ornithorhyncus* occurs, I probably see the first two or three letters distinctly, then have a vague impression of a long line of high and low letters, and then catch the final *cus* as my eye moves towards the right-hand side of the page. With my Australia-tendencies at work, this is fully enough to give me the meaning of the whole word *ornithorhyncus*.

Again: if we read by letters, we should not be so apt as we are to overlook misprints in books. As we read so largely by general impression, a wrong letter here or there does not matter, — does not attract the attention.

§ 37. **The Physiological Conditions of Attention.** — To understand the physiological conditions of attention, we must understand the general plan upon which the nervous system is built.

The structural plan of the nervous system

Think of the nerves which run from the sense-organs to the brain as a number of railway-lines. These lines converge at first in the lower brain-centres, the grey masses within the brain (*F.*, 752). Running farther, they converge again in the various sense-centres of the brain cortex. Running still farther, they end in intermediate areas, termed the 'association centres of Flechsig.' From all three sets of stations other lines run out, either directly or indirectly (*i.e.*, by way of lower centres) to the muscles.

and its meaning for attention.

The use of the centres of the first class we shall discuss later (§§ 72, 106). We are concerned now with the sense-centres and association-centres. Attention to an idea probably means, on the physiological side, that the lines running to and from the area within which that idea is excited and the other areas ('sense' and 'association') functionally connected with it are open, whereas the lines of intercommunication throughout the rest of the cortex are more or less effectually blocked.

The cortex as a whole represents a certain limited amount of energy. When, therefore, the currents of excitation are determined to a particular area, the enhanced activity of this area drains the rest of the cortex of its energy, on the same principle that the lights in an electric car grow dim when the car starts.

It should, perhaps, be said that some authors regard the *frontal lobes* of the brain as a supreme regulative centre, whose activity is essential for the formation of an attentive consciousness. But the researches of P. Flechsig (professor of psychiatry in the University of Leipsic) seem to make this position untenable (see Quest. 11, p. 23).

When a cell has exploded, it must take time to recover; it cannot explode again till it has been recharged. That is why attention is interrupted, why we can attend only for a few seconds at a time. The spurts of the attention-wave correspond to the successive discharges of cortical cells.

The bodily conditions of *affection* (p. 68) are to be looked for in the state of nutrition of the excited cortical areas. If these are well-nourished, irrigated by abundant fresh blood, the thing attended to is pleasant; if they are ill-nourished, it is unpleasant.

Questions and Exercises

(1) Give a list of the things which in your own experience appeal to the passive attention, and of the things which always require an effort if they are to be attended to. Can you draw from your experience any instance of secondary passive attention? If so, trace its development from active attention.

(2) Write out all the words you can think of which are descriptive of mental constitution.

(3) What incidents can you remember, in history or in fiction, which bring out differences of mental constitution?

(4) Describe carefully the bodily attitude (*a*) of the scout (visual attention) and (*b*) of the eavesdropper (auditory attention). What sensations are set up by the two attitudes? What is the reason for the difference between the two?

(5) Prove the fact that the attention is interrupted, not continuous, in this way. Seat the subject blindfold in a chair, so that he sits sidewise to the length of the room. Hold a watch at the level of his ear, and remove it until its ticking is only just audible. As he listens, the sound will alternately disappear and reappear: disappear as the attention-wave falls, and reappear as it rises again. Let him lift his finger at each disappearance. Count off on the watch the number of seconds between disappearance and disappearance.

(6) Draw, on a large scale, an outline map of the nervous system, showing the ingoing and outgoing nerves, and the three sets of stations. Mark the two kinds of nerves in different-coloured inks. With the sketch in your hand, and without looking at the book, tell what happens in the nervous system (*a*) when we are attending to a pleasant sight, and (*b*) when we are attending to an unpleasant sound.

(7) If unpleasant feelings are bad for us, why should we be attracted by unpleasant topics? Why should we be 'fascinated' by accounts of brutal murders and distressing accidents?

(8) If a child has fallen and hurt itself, and you can distract its attention from the pain, it stops crying. Why is this?

(9) To test the range of attention, *i.e.*, to find out how many objects can be attended to at once, you must have a simple apparatus constructed. Fasten two stout uprights, 4 ft. high, upon a base. The inner surfaces of the uprights must be grooved, so that a board 1 ft. wide will slide down easily between them. The uprights may be braced together behind. Make the sliding board 3 ft. long. At its centre cut out a 10-inch square. It is well to paint board and uprights black. Six inches from one end of the board, and directly in the middle, tack a round piece of white card, of 1 in. diameter.

Cut pieces of stout cardboard 1 ft. square. Over 10 square inches of the cards paste (*a*) large black letters in haphazard order, and (*b*) sets of short words. Four words of four letters should fill the 10 inches. For each experiment pin one of these cards to the back of the uprights, with its upper edge just 1 ft. below their top.

Raise the sliding board, so that its bottom is level with the bottom of the card attached to the uprights. The card is now covered by the board; and the round white mark on the board lies over the centre of the group of words or letters. Tell your audience to look at this mark: and drop the board. The 10-inch opening falls over the 10-inch group of letters, letting them be seen for a moment; and the board comes to rest with its upper portion covering the card again. To prevent noise, lay a strip of felt between the feet of the uprights. And if the onlookers have (as will probably be the case) *followed* the falling mark with their eyes, instead of looking steadily at the place that it fell from, repeat the experiment with the same card. Let each member of the audience write down what letters or words he sees as the board drops.

By driving a wire-nail through one of the braces of the uprights and letting the point penetrate the back of the sliding board you can hold the latter in position till the audience is ready for an experiment. Then release it by withdrawing the nail.

(10) It is said above that a performing animal (a trained dog or monkey) gives evidence of secondary passive attention. Explain this.

(11) Why is it that the hidden drawing in a 'puzzle picture' is so difficult to see at first, and so difficult *not* to see when you have once found it.

(12) Can you give any reason, besides that mentioned in § 12, for the occurrence of blanks in your introspection of the idea of the chair (§ 4)?

(13) "It is only when we are feeling that we are attending; only when we are attending that we are feeling" (p. 82). Yet when we are attending strenuously, — engaged upon a difficult problem, standing ready to return the service of an unknown opponent at tennis, — feeling is by no means prominent in consciousness. Can you explain this seeming discrepancy?

(14) Make a careful analysis of the experience of effort. What sensations do you find, over and above those mentioned on p. 85?

References

James, *Textbook*, ch. xiii. (Perform the experiments indicated in Figs. 54–56.)

Sully, *Human Mind*, vol. I., pp. 74–79, ch. vi.

Titchener, *Outline*, §§ 35–42.

Wundt, *Lectures*, Lects. XVI., XVII.

Wundt, *Outlines*, § 15.

CHAPTER VI

PERCEPTION

§ 38. **The Formation of Perceptions and Ideas.** — Most people, if asked what were the simplest bits of mental experience, of mind, that they could name would say: "Perceptions, and feelings, and ideas." They would look upon sensations, if they thought of them at all, as physical processes (§ 27), and they would not dream of separating affection from the perceptions and ideas that it accompanies.

We saw in § 28 how easily the feelings might be taken for simple, elementary processes. It is natural that the same mistake should be made in the case of perceptions and ideas: for these, with the feelings, *are* the simplest processes that occur in real life, in everyday mental experience. Recalling the terms used in § 8 we may say that they are the simplest *concrete* processes in mind, — the simplest that we can find by ordinary observation, without employing the scientific method of introspection.

Feeling we have already discussed (§ 25). And we have more than once referred to perceptions and ideas as 'groups of sensations.' How, now, are these concrete processes formed? How is it that certain sensations get welded or blended together so closely that the whole looks, at first sight, like one simple process?

How sensations are put together.

If we make our question more definite, it will furnish its own answer. Why does my idea of Lake Cayuga include sensations of *blue* and *cold*, and not sensations of *sour* and *strain?* The reason is clear.

Sensations hold together in consciousness when the stimuli, the things or processes in the outside world that give rise to them, occur together. Natural objects appeal to the mind, in each of their aspects, through some particular sense-organ: every object, as a whole, appealing to several sense-organs. The sensations hold together, then, just as the different aspects of the natural object hold together. The perception or idea stands for, represents, *means* some material thing or process; and the sensations that compose it can no more fall apart than the blueness of the water can be separated in my experience from its coolness.

The bidding of nature.

Sensations are welded together, therefore, under the influence or at the bidding of our physical surroundings. A perception or idea always means something, stands for some object. Mind is developed in close interaction with nature; and what nature binds together remains together in perception and idea.

Perception externally, idea internally aroused.

§ 39. **The Difference between Perception and Idea.** — Perceptions and ideas are, both alike, groups of sensations; and, both alike, groups of sensations which are held together by the command of nature. They differ solely in this respect: that, when we perceive, the object which arouses the sensations is actually before us, appealing to various sense-organs; whereas, when we have an idea, the object is not before us, but the sensations are set up inside the brain without any disturbance of the organs on the surface of the body.

Instances of perception and idea.

Sensations may be set up from outside the body, by stimulation of eye or ear or nose; or they may be set up from within the body, by an excitation in the cortical area to which the nerves from eye or ear or nose run (§§ 14, 16). This excitation may be aroused directly, by a change in the blood-supply of the cortical area; or indirectly, by an impulse running to this area from other cells which have been exploded by a stimulus working at the outside of the body. Thus I may see a green tree in my mind's eye when there is before me neither any green object nor anything to suggest green: in this case the green-cells have been exploded by a change in blood-supply. Or I may see it because I am reading a description of scenery in which the printed word 'green' occurs: in this case the green-cells are exploded indirectly, by way of the word stimulus. A perception, then, contains sensations of the first kind, those set up from outside the body; an idea consists wholly of sensations of the second kind, those aroused directly or indirectly within the brain itself. When I am looking at a table, as it stands in front of me, I have a *perception* of a table, I perceive it; but if I shut my eyes and think of a table, or if some particular table 'comes into my head' along with other memories, or if I am picturing to myself the sort of table I mean to buy when I am rich enough to furnish my study properly, then I have an *idea* of a table, I ideate it.

Introspective differences: This difference, however, is most certainly a difference that makes itself known to introspection. We can all tell a perception from an idea. Sometimes, it is true, we make laughable mistakes by confusing the two: but only a drunkard or a madman would habitually confound real things with remembered or imagined things. What, then, is the introspective difference between the two groups of sensations?

the idea is less vivid, In the first place, (1) the sensations differ greatly in strength or intensity in the two cases. My perception of a table is much more vivid, much more of a living reality, than my idea of it is. Ideas are pale and faint, compared with perceptions. Again, (2) the sensations that make up the idea are less lasting than those of the perception. Of course, the perception (just because it is mental) is a *process*, a going on: as I look at the table the centre of interest changes, the attention travels from sensation to sensation; I cannot hold the whole sensation-group fixed and steady, as if it were a *thing*. But the idea is still less stable, still more fluid; the sensations that make it up come and go with even greater swiftness. And lastly, (3) the idea is less perfect, a less accurate picture of the outside world, than the perception. Look at the view from your window. Now shut your eyes, and form an idea of the view. The space has shrunk, so to speak; details are lost; you are not sure about this and that feature of the landscape. Or try to form an idea of the happenings of five minutes. It is hardly possible: the time seems to have shrunk, as the space did in the previous example.—These are the three differences that introspection reveals between perception and idea, between a sensation-group containing outside elements and a sensation-group made up entirely of elements from within the brain.

less stable

and less accurate than the perception.

Notice the important differences in conscious surroundings and conscious background in the two cases. When we perceive, the sensations are held fast, and constantly renewed by their stimuli. The details of the landscape, the events of the five minutes, are *there* to catch the eye and ear. But when we are merely 'thinking of' something, there are no outside stimuli to attach our thought to, to refresh ourselves by; it requires a greater effort to attend, and there is a crowd of rival ideas hovering round the central idea and ready to displace it. So the idea is weaker, more changeable and less complete than the perception.

Reason for these differences.

Since the differences between the inside and the outside sensations are so great, some psychologists have held that their excitations must occur in different parts of the brain-cortex. This view is borne out by the recent work of Flechsig (see pp. 23, 90 f.), who distinguishes the sense-centres from the 'association' centres of the cortex. Thus a sensation of sight due to the action of light upon the eye would be set up by the explosion of cells in the sight-centre of the occipital lobes; but if that sensation were recalled in memory, when no stimulus was present, it would be set up in an 'association' area of the cortex, an area lying between the sight-centre and the centre for touch and organic sensation. Pathology offers confirmatory evidence; but the matter is still in dispute, and will doubtless remain so for some time to come. (See Donaldson, *Growth of Brain*, 266.)

The outside world is a world of quality,

§ 40. **The Three Classes of Perceptions.** — There are three aspects of things that strike us, as we look out upon the world around us. (1) In the first place, we are struck by the *likenesses* and *differences* among things. Everything is itself, and not something else; and at the same time, everything is more like certain things than it is like certain other things. (2) Secondly, we are struck by the arrangement of things in *space*. One thing is here, another there; one is far off, another close at hand; one is large, another small; one of this form, another of that. And lastly, (3) we are struck by the progress of things in *time*. The thunder follows the lightning; a bird flies across the landscape now slowly and now quickly; the waves beat upon the shore with a definite rhythm; the shooting stars drop irregularly, in quick succession or at long intervals.

of space

and of time.

All three aspects are practically important.

All these aspects of things are of great practical importance to us: otherwise, indeed, they would never have 'struck' us at all. Think of the importance of the first aspect for the merchant! He must know good cloth from bad, good sugar from bad, good timber from bad; else we shall not go to him to supply us with food and clothes and shelter. Again, we must know how far off things are, and where they are, and how large they will prove to be when we get to them; else navigation and the planning of towns and the building of houses would be impossible. Lastly, we must know when things happen, and how long they take, and how often they occur; else we could not travel, — could not even lay out a single day's work.

Each of these three aspects of material things gives rise to its own set of perceptions; and each set of perceptions is built up upon a particular attribute or aspect of sensations. (1) Perceptions of the first kind may be termed perceptions of quality or *qualitative* perceptions; they tell us of the nature or quality of things. These perceptions are built up of sensations looked at as qualities (§ 22), without regard to their intensity, etc. (2) Perceptions of the second kind are termed perceptions of space, or *spatial* perceptions. They are built up of sensations looked at as surfaces or *extents*, not as qualities or intensities. (3) Perceptions of the third kind are perceptions of time or *temporal* perceptions, and are built up of sensations looked at as lengths of time, or *durations*, not as qualities, intensities or extents.

We have qualitative, spatial and temporal perceptions.

We are already familiar with the idea that sensations have quality and, besides quality, a certain amount of strength or intensity. The fact that they have extent and duration is something that we have not hitherto touched on.

Take *duration* first. Think of any sensation that occurs to you: a red, a sweet, a pressure, a strain, a tone, a scent. Can you think of it as lasting no time? No! However short it is, it must last for a moment. And this character of lasting a little while, of having duration, — a character which belongs to all sensations, from whatever organ they come, — is what makes it possible for them to combine in such a way as to form time-perceptions.

Extent is rather more difficult. We are accustomed to regard extent as a mark of material things, of solid bodies; and it seems strange to say that mental processes have it. But think of a colour. Can you think of it in any other way than as a *patch* of colour, a spread-out colour? However small you make it in your thought, however much you reduce it to a point of colour, has it not still length and breadth? So with pressure on the skin. Think of a pressure which is as point-like as you can conceive it, the pressure of a fine needle. Still it is spread out; you could measure the length and breadth of the needle-point under the microscope: and you cannot form an idea of pressure at all except as having some length and breadth, some extent.

This character of extent belongs only to sensations of sight and to the sensations of pressure coming from skin and joint. But these sensations never appear in consciousness without it; and through it we get our perceptions of space. — No other sensations possess it: not even sensations of taste or temperature, still less those of sound and smell. It is curious to think, but it is true, that we should not know the world to be a space-world if we had no sensations of colour or brightness or pressure.

Instances of perception.

Most important of our *qualitative* perceptions are those of colour (mixture of brightness and pure colour), of a 'note' or chord in music, of taste and smell, and of touch (mixture of skin sensations with those coming from muscle, tendon and joint). Among *spatial* perceptions we may mention those of place or position, of form, of size, of distance, of direction, of extent of movement; and among *temporal* perceptions, those of place or position in time, of rhythm, of frequency, and of rate of movement. Each of these perceptions has its own psychological history, its own mode of formation. We must be content here to touch very briefly upon a few of the most valuable.

§ 41. **The Development of Perception.** — Before we go on to deal with special perceptions, however, we must notice the fact that perception, like sensation, shows different strata or levels of development. In the early days of mental evolution, perception was wholly dominated by the object of perception, the material thing perceived. But as experience grew, and the store of ideas increased, the mind became ready to meet the material thing half-way; a full and complete perception could be touched-off by some single aspect of the thing, and the other aspects supplied by sensations aroused within the brain. The perception now includes not only outside sensations, but in addition to these a large — perhaps an overwhelming — number of inside sensations. And lastly, as language developed, and men came to have more and more thoughts that they wished to communicate to each other, the thing perceived degenerated into a mere symbol or sign of the idea, the group of central sensations, that its perception brought into consciousness: the perceived thing was actually attended *from*, and the central sensations that clustered round the outside sensations were attended *to*. So we have a development in three stages: first the pure perception, made up entirely of outside sensations; then the mixed perception, — or *assimilation*, as it is technically named, — made up partly of inside and partly of outside sensations; and lastly the symbolic perception, in which the

Pure perception, assimilation and symbolic perception.

only service done by outside sensations is that of arousing the important, inside processes.

Instances of the three sorts of perception.

We have instances of the original form of perception in our own experience, when we are brought into contact with something altogether new and strange to us. Suppose, *e.g.*, that a friend shows you a photograph, consisting of a circle, scrawled all over with random zigzag marks, mounted on a cabinet-sized card, and dated. What is it? You do not know: you have a *pure* perception, — all that the thing means to you is just that which it is, a circular photograph of scrawls. — Then your friend says: "What happened on that date?" A light flashes across you: "The great earthquake!" you say. Now the thing is not a photograph of scrawls; it is the record of an earthquake, a seismogram. Your perception has become *mixed;* a mass of central sensations has been awakened, and gives the photograph a different and a more definite meaning.

All our everyday perceptions are of this mixed sort, *i.e.*, are assimilations, unless indeed they have advanced to the symbolic stage. Thus I say that I 'see' my table. What I see, however, is merely a surface of a certain colour, distorted by perspective as I approach it from this side or from that. When I perceive the table, I have in mind a good deal more than the sensations coming in through the eye. I have ideas of hardness and smoothness, ideas of the uses of the table as a piece of furniture, perhaps the idea of the word 'table.' The perception is mixed.

Chief among our *symbolic* perceptions are those of written and spoken words. As you have read this book, have you thought of the form of the words, the character of the type, the blackness of the letters? Your aim has rather been to 'understand' the words. You have instinctively attended *from* the material of perception, and attended *to* the ideas which that material called up.

The result of this evolution is (1) that the psychologist has no easy task when he tries to find out how a particular perception was first formed, and (2) that his enquiry is likely to end in the discovery of quite unexpected facts. Our minds are so well stocked with ideas, and our nervous tendencies have given us so many short cuts from fact to meaning (from pure to symbolic perception), that we hardly recognise our perceptions when they are dissected and laid out before us free from their central associates. Hence the reader must not be surprised if he cannot easily verify some of the following statements by an appeal to his own consciousness.

§ 42. **Perceptions of Quality.** — Qualitative perceptions have undergone less change than perceptions of time and of space. This is natural: for if a thing is sufficiently *itself* to impress its nature upon us, there is no reason why this impression should be lost or modified; indeed, the perception would cease to be of value as a perception of the thing's nature, if it were liable to change and modification. Perceptions of time and space, on the other hand, once acquired slowly and laboriously, with continual testing and retesting, have changed much, and gained much by the change. It would be a great waste of time and energy if we were obliged to go through all the steps that our ancestors took, when we are called upon to judge of movement or rhythm, distance or direction; but quality is the same for us as it was for them.

Qualitative perceptions are formed to-day as they always have been,

All qualitative perceptions are formed upon the same plan. A number of sensation qualities are run together, fused or blended together; and the result of the fusion or blending is the perception of the nature or character of some material object.

by fusion

Notice that the qualitative perception is not the *sum* of the sensation qualities contained in it. That would be the

(not by summation) of sensations.

case if the sensations were things, bits of mind in the literal sense. It cannot be the case when they are processes: processes run into each other, interfere with each other. Hence the qualitative perception is something less, and something more, than the sum of its sensation qualities: less, because some of the sensations overbear or check or interfere with others; more, because the result of the mixture is novel, — is a *perception*, a process that *means* something, a concrete process with a specific character of its own.

Taste. We will take three illustrations. (1) Consider the 'taste' of coffee. This is a qualitative perception. It contains the sensations of bitter, the real taste of the coffee-berry; of warmth; of pressure, the 'feel' of the liquid in the mouth; a peculiar fragrance, the coffee odour; and a sight, the clear brown or cloudy brown of the coffee in the cup. These are the necessary, essential elements in the perception. There may be others: the sight sensation may bring with it a space idea, an idea of the position of cup and saucer upon the spread table, etc.; and the word 'coffee' may, very likely, be added. In this case the perception is of the mixed sort: but it may quite well be a pure perception of quality. In either case it is not the simple process that at first it seems to

Resistance. be. (2) Consider the perception of resistance. Here we have the qualities of pressure on the skin; of strain in the tendons, say, of the arm; and of pressure from the jamming together of joints and the contraction of muscles. Usually, a space suggestion is added: the form and direction of the door that resists us, or of the obstacle that we are trying to

Clang. remove; but the addition is not necessary. (3) Suppose that a note is sounded upon some instrument which we cannot see. Most people would tell us that the note is a single sensation; and yet we are able to say at once that it is a piano note, or a violin or trumpet or banjo note. As a matter of fact, every note is a mixture of tones and noises. There is one loud tone, which gives its name to the note (*c*, *d*, *e*, etc.); there are a number of weaker tones, higher in the scale than the loud note, and therefore called 'overtones'; and there are a number of noise qualities (*H.*, 237; *N.*, ch. xxxv.). All these sensations fuse into the single note, the perception. But the same note sounds different on different instruments, because (*a*) the overtones are different, and (*b*) the noises are different. In the piano the noise is a dull thud; in the violin a harsh scrape; in the banjo a click or pluck, etc. In the piano certain overtones are strong, in the violin others, etc. The trained ear can pick out the separate overtones and noises; the untrained ear can do no more than hear 'the *same* note *differently*.'

The notes of a musical instrument are an excellent instance of qualitative perception. The space idea of the instrument, piano or violin, is not apt to combine with them; and the result of the mixture of sensations is so different from a mere sum of tones and noises, so much 'itself,' that unmusical persons have difficulty in realising its complex nature.

The chief reason why music employs no more than 90 out of the possible 11,000 tones (§ 18) is that the musical scale began as a voice-scale, a succession of tones sung. The range of the human voice is limited; hence the musical scale is cut short at both ends. And our power to adjust the larynx is limited; hence the unit of the musical scale **Music** (the musical 'semitone') is much larger than the unit of hearing (the 'tone' of § 18). Other reasons are the necessity of keeping a keyboard small enough for easy handling, the unpleasant shrillness of very high tones, the faintness of very low tones, etc.

The 'local sign' of a pressure

§ 43. **Perceptions of Space: Place or Locality upon the Skin.** — If you are passing through a room in the dark, and bump your knee against something, you are quite sure that it is your *knee* that is hurt: more, you are sure that it is your right (or left) knee: and more still, you know that it is hurt just in one particular place, above or below, to right or left, of the knee-cap. How do you know this? What tells you that the bump is a knee-bump?

One might suppose, perhaps, that a knee-pressure is different, in quality, from a pressure elsewhere. But that is not the case: all pressure sensations are alike in quality. Regarded as pressures, knee-bump and shin-bump — to say nothing of right and left knee-bumps — are precisely the same. So we must look elsewhere for an explanation.

We have two facts to notice. The first is that, although skin and joint are *able* to give us space perceptions (their pressure sensations having the attribute of extent), yet, in actual mental history, their development as 'space organs' does not keep anything like even pace with the development of the eye. Doubtless there are perceptions of space in the animal kingdom before there are eyes; but when the eyes have arrived, they make haste to take upon themselves the burden of supplying these perceptions. The eye, then, is *the* 'space organ.' The second fact is that primitive man must have come into conscious contact with things, for the most part, in the daytime; in the dark he would have been sleeping. That is, he would *see* what struck him, and where it struck him. — Putting these facts together, we can understand what introspection shows: that most of us know where we are pressed or struck by having a *picture* of the place flash up in our minds, a picture which is very accurate at the centre, though very hazy in the surrounding parts. We can say, in the dark, "I have bumped my knee!" because a picture of the knee comes up at the moment of the bump: we can say, with our eyes shut, "You are touching my cheek!" because a picture of the cheek arises at the touch. The perception is a mixed perception.

is usually a visual picture.

Not everybody has this picture, however. Those who do not have it 'place' the bump or pressure by means of a *word*. The word 'knee' or 'cheek' occurs to them, as they are touched. They or their ancestors must have gone through the picture stage: but now their mental constitution is such that the picture does not arise. The word, originally used to name the picture, has taken the picture's place altogether, by one of those mental 'short cuts' of which we spoke in § 41.

§ 44. **Perceptions of Space: Position.** — The perception of an object in space includes two perceptions: those of place and of distance. We have seen that place on the skin is perceived by sight: how, now, is place in the field of vision perceived? We see where we are touched: do we see where we see?

Partly yes, partly no. (a) If a red patch be moved over the retina, from the centre outwards, — the eye

The perception of 'place where' by the eye.

being kept steady during the movement, — it will be seen as red only for a short time. When it gets to a certain distance from the centre, it becomes a greyish blue or yellow; and as it travels still further, passes over into mere grey.[1] Here, then, we have differences of sensation quality, corresponding to differences of place in the field of vision. Knowing that the patch was red, and seeing it bluish, we should know approximately *where* it was: the eye could see *where* it saw, though the skin (all pressures being alike) cannot 'feel' *where* it 'feels.' But (*b*) it is needful for us to see things, to apprehend qualities, as they *are;* and we therefore always move the eyes, so as to bring the object upon the centre of the retina. We do not allow a red to remain bluish, by remaining away from the centre; we look directly at it. Now plainly, the more we have to move the eye to get the object to the centre, the stronger will be the pressure and strain sensations from the muscles and tendons which turn the eye in its socket. So each 'look' of the object gets welded together with a special group of muscle and tendon sensations; and the whole sensation-mass tells us where the object is. Partly, the eye sees *where* it sees, for itself; partly, sensations of pressure and strain, added to the look of the object, tell us where the object is in the field of vision.

This, then, is the way in which we are able to 'place' an object in the field of vision. But how do we come to see it as a *solid* object? And how do we know its *distance* from us?

[1] This is Experiment 6, p. 52 above.

The perception of solidity is the result of our having *two* eyes. The eyes take two pictures of the object, from two slightly different points of view. These pictures are laid over each other; and their combination into a single picture results. But if a single picture is to be formed from two dissimilar pictures, the object which the picture represents must appear solid.

The perception of solidity

So much, again, the eyes do for themselves; and, again, the rest is done for them by the muscles and tendons around them. If an object is very near us, we must turn the eyes strongly inwards, towards each other, to see it. If it is far off, we can let the eyes swing outwards; until, if the object is at the horizon, they are both looking straight forward, parallel with each other. The nearer the object, then, the greater is the pressure and strain about the eye; the farther off the object, the less this pressure and strain. In every case of our looking at something in space, a special sensation-mass from muscle and tendon appears to tell us of the distance of the thing from us.

and of distance.

§ 45. **Perceptions of Space: Bodily Posture.** — Our perception of the posture or attitude of our own body is, in general, a perception of sight. We *see* how we are sitting or lying or standing. Even when we are in the dark, we call up a mental picture of ourselves to tell us of our position; and in thinking how our legs are disposed under the table, we call up a like picture of the lower part of the body.

Bodily posture as perceived visually

At the same time, sensations from skin and joint and tactually. play a very considerable part in this perception of our own position. If the soles of our feet were rendered insensible, we should not walk as confidently as we do with sensations constantly coming in from the skin of ball and heel. If the hips became insensible to the weight of the body, we should make grievous mistakes in estimating our position. Moreover, we have seen (§ 18) that a special sense-organ, the shake-organ in the ear, is set apart to give us warning of any loss of balance or of command of ourselves in space.

Suppose that you are lying full-length, your eyes shut, on a board which can be tilted up and down like a seesaw. Your head is lowered, and you are to call out when you are 'standing on your head.' You call out much too soon: as soon as the weight of the body begins to tell upon the back of the neck, jamming the vertebræ together, you think that you are vertical. — Now you are brought back to the horizontal; you are to call out when you are lying perfectly flat. You call too late; not till the weight gets well off the neck, and you 'feel your feet,' do you think that you are level. Evidently, then, the distribution of the weight of the body, the jamming of some joints and the free play of others, has something to do with our perception of the posture of the body.

§ 46. **Perceptions of Space: Movement.** — Movement can be perceived in two ways: by touch (sensations from skin, muscle, tendon and joint) and by sight.

Tactual perception of movement.

(1) If we are carried through space at an even rate, without jar, we have no perception of movement. The earth rotates on its axis; it revolves round the sun; it rushes forward with the sun into space. We 'feel' nothing of all this movement,

because it is quite even and uniform. So you do not know that you are rising in a balloon, until you look over the side of the car and *see* the trees and houses getting smaller beneath you; you do not 'feel' the motion. One may have the same experience, of ignorance of movement, on a sail-boat or in a well-hung and rubber-tired carriage.

As soon as the movement slows or quickens, however, we perceive it. When the brake is put on the carriage, you are thrown forward; as the speed increases, you are forced back against the cushions. This throwing backward and forward means a shift of the weight of your body, a change in the pressures upon your skin, a stretching of certain muscles and tendons and a tightening of others, a jamming of this joint and a pulling-apart of that. The mass of sensations thus aroused gives you the perception of movement.

We can perceive the movement of a single limb (arm or leg) by the help of joint sensations alone. The turning of the joint in its socket tells us both that the limb is moving and how far it has gone. We might be blind, and have no sensations from skin, muscle or tendon; and we should still know when, and how far, our limbs moved.

The sensations from skin, joint, tendon and muscle that give us the perception of movement are sometimes called, for that reason, *motor* sensations. But we do not *sense* movement.— there is no peculiar movement organ; we *perceive* it. Hence it is best not to use the phrase 'motor sensations.'

Visual perception of movement.

(2) The earliest perception of movement by the eye consisted in seeing something 'in two places at once.' Think of the fall of a shooting star down the sky. The star leaves a trail of light behind it as it

drops; so that you see it, so to speak, at the place it started from, and at the place where it disappears, all in the same moment. Seeing it thus, you perceive that it has moved.

We do not need now to *see* the moving object in two places at once; but we must *remember* that it was in a different place a little while ago, if we are to perceive its movement. We 'see' that the train moves across the landscape, because we remember that a second ago it was at *that* tree, and a second before at that other tree, and so on. If the whole landscape moved, trees and train and all, — ourselves and our standing-ground included, — we should not perceive the movement.

We said just now that the solar system is rushing on into space. We do not 'feel' the movement, because it is even and uniform; we do not see it, because *everything* is moving: there is no 'tree' from which the movement starts, no fixed point which we can remember having passed so many seconds or minutes or hours ago. Just as we perceive the movement of the body by touch only when the rate of movement changes, so we see movement only when an object changes its position among other, fixed objects.

§ 47. **Perceptions of Time: Rhythm.** — All sensations have the attribute of duration, of lasting a little while; so that any class of sensations can give rise to perceptions of time. For the particular time-perception that we have chosen for discussion here, however, — for the perception of *rhythm*, — two sensation-groups are of especial importance: the *tactual* group, made up of sensations from skin, muscle, tendon and joint; and the *tactual-auditory* group, made up of these sensations and of sensations of hearing.

(1) The four limbs are, so to speak, four pendulums, attached to the trunk of the body. As we run or walk, the legs swing alternately, and with each leg swings the arm of the opposite side. Here we have the basis of the idea of rhythm; a strong sensation-mass from the leg whose foot rests upon the ground, the leg that carries the weight of the body, followed at equal intervals by a weak sensation-mass from the leg that swings through the air before its foot is set down. As the leg swings, the arm swings; and at the moment that the foot is set down, the arm pulls with its full weight upon the shoulder; so that the strong leg-sensations are reinforced by strong arm-sensations, and the weak by weak. The rhythm is thus still further accented. **Tactual rhythm.**

(2) This movement-rhythm, as we may call it, — the alternation of strong and weak sensation-masses from some moving part of the body, arm or hand or foot, — plays a part in every perception of rhythm. But pure movement-rhythm has not been nearly so highly developed as the compound rhythm of movement and hearing. The reason is that the limbs are *fixed* to the body; they can do no more than oscillate to and fro, up and down; while sounds are *free*, not attached to anything, and so can be divided up into rhythmical groups at pleasure. Movement can give us nothing but one-two rhythms; sound and movement together give us the one-two-three rhythms of music and dancing. **Tactual-auditory rhythm.**

We are so accustomed to regard rhythm as something to *hear* that the reader may never have thought of walking or running as a movement-rhythm (*press*-swing, *press*-swing), but only as a hearing rhythm (*tramp*-tramp, *tramp*-tramp). But close your ears with cotton-wool and walk across the room, letting your arms swing naturally with the movement of the legs. You can easily get into the movement-rhythm: *one*-and *one*-and *one*. Notice the strong jerk or pull of the heavy arm at each *one*, *i.e.*, at each pressure of a foot upon the floor.

When next you listen to music, notice that you 'keep time' not by the ear only, but by some movement (of head, finger, etc.) as well.

§ 48. **What Perception Means.** — We cannot here discuss more of the perceptions that fall under the three heads of quality, space and time; the examples chosen must suffice. These few instances, however, are enough to show the reader what the value of perception is, and what 'perceiving' means to us.

Perception differentiates the outside world.

Plainly, perception means a breaking-up of the world around us. To the primitive animal and to the human infant the world must be, in Professor James' language, "one big blooming buzzing Confusion." As the sense-organs grow, as the channels through which the world gains entry into mind become more numerous and more complicated, this Confusion is broken up into parts: quality parts, space parts, time parts. Mind is never fully able to cope with the world: there are stars that our best telescopes cannot find, and animal structures too delicate for our finest microscopes to reveal. But the farther perception goes, the more concrete processes we have that *mean* different parts or aspects of the material universe, the better do we understand the world. With perception comes knowledge: without perception we should be without science. Just as the course of animal evolution runs from creatures made up of a single sort of tissue to creatures of many tissues, — blood and nerves and muscles and bone and the rest, — so does mental evolution run from the confused one-tissue knowledge of the infant to the many-sided, differentiated knowledge of the scientific man. We saw in § 41 that perception itself undergoes transformation and development; but no one of the three steps there mentioned is so important as the first step of all, — the step from the single world of confusion to the ordered world of perception.

§ 49. **Illusions of Perception.** — Mind, however, is not wholly adequate to the world; we do not always perceive aright. For one thing, the sense-organs are not always equal to the demands laid upon them: a bird may be 'too far off to be seen,' and yet it would be wrong to say that there is no bird in the sky. For another, we are biassed in our outlook over nature; our nervous tendencies, which lead us to apperceive objects rather than to perceive them, are likely to lead us astray, to make us see what is not there, or to fail in seeing what is. So there arise what are called *illusions*, perceptions in which the world is 'playing with' us (Lat. *ludus*, game) instead of telling us the truth about itself. **Illusory perceptions,**

The most important and most instructive illusions are those of *space* perception, in its various forms.

Illusions of *Form*. — Draw a perfect square. Notice that it looks higher than it is broad. The reason is that the **of form,** muscles around the eyes can move them out and in more easily than they can move them up and down. Since it requires more *effort* to look up and down the square than to look across it, the *distance* up and down is taken to be greater.

Draw a number of 'squares' which are a little lower than they are broad. Note which of them looks to be exactly right, a real square. Measure the height and subtract it from the breadth. The result gives you the amount of the illusion.

of size,

Illusions of *Size*. — It is a curious fact that, if a thing be estimated by touch (that is, by the skin with the assistance of muscle, tendon and joint) it seems to be larger than it does to the eye; whereas, if it be estimated by the skin alone, it seems smaller than it does to sight. Thus a hollow tooth 'feels' much larger, both to tongue and finger, than it looks in the mirror. Since we have learned to trust our eyes, we regard the tactual perception as illusory.

We read, however, that men born blind, and restored to sight by a surgical operation, are surprised at the largeness of the objects about them. This does not mean, as it might seem to do, that tactual space is smaller than the space of sight. The things seen appear to the patient to press in upon him, he remaining passive; just as solid bodies press down upon the passive skin. It is skin-space, then, that he compares with the space of sight: and it is this skin-space, not tactual space, that seems to him to be smaller than the sight-space.

The facts mean, evidently, that we live in three distinct spaces: skin-space, touch-space and eye-space. The three do not altogether agree: there is no real reason why they should, since the organs are different. We have learned always to believe the eye, however, and so look upon the skin-size and touch-size of things as illusory. —

An illusion of size is given in Fig. 11. The vertical line looks longer in the upper figure than in the lower. This is because the eyes are tempted to run on, beyond the vertical, in the one case; while they are checked, held back, at the ends of the vertical in the other.

Illusions of *Direction.* — The laws of perspective are largely based upon illusions of direction. Look out along a railway track: the lines seem to meet at the horizon, though you know that they do not. Look at your table, from one corner of the room: it seems to be a trapezoid, though you know that it is a parallelogram. The seen direction of the lines is illusory. **of direction.**

These illusions are all illusions of the first class; due to the inability of the sense-organs to meet the requirements laid upon them. Apperceptive illusions are equally common. Thus if we are walking after a shower on a moonlight evening, we may take the shadow of a tree-trunk for a runnel of water, and step over it. Our mind is full of ideas of wetness. — Or in traversing a lonely spot at night-time we may see a ghost, which proves on nearer examination to be a white birch-trunk or a white post. Our mind is full of ghost-stories. — Cf. *H.*, Lesson X. **Apperceptive illusions.**

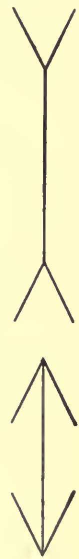

FIG. 11

In all cases of space illusion, the final appeal is to the *eye*. Not to the unassisted eye; for that is itself subject to illusion: but to the *measuring eye*, — the eye armed with a ruler and a pair of compasses. What touch and sight tell us of the world of space may, as we have learned by experience, be very far from right. What sight tells us under the conditions of measurement we believe to be true; the railway lines *are* parallel, the table *is* a parallelogram, the verticals of Fig. 11 *are* equal, the square *is* equilateral, — in spite of all appearances to the contrary, — because the measuring eye tells us so. Measured or mathematical 'seeing' is always 'believing.' **The final appeal is to the eye.**

Questions and Exercises

(1) Qualitative Perceptions.

1. The middle *c* of the piano contains, as overtones, the *c* and *g* of the next higher octave, and the *c*, *e* and *g* of the octave above that. Strike some one of these overtones softly, by itself. Then strike the middle *c* loudly, and try to hear in it the overtone which you sounded a moment before. If you think you can, sing the overtone, and then strike the note to make sure that you have it correctly.
2. Have a number of chords struck on the piano: chords of two, three, four notes, in random order. After a chord has been struck, ask yourself how many notes it contained. Continue the practice until you can distinguish accurately a two-chord from a three-chord, etc.
3. Try, by introspection, to find out what sensations are contained in the following perceptions: hardness, wetness, roughness, the 'taste' of tea, the 'taste' of lemonade. Make several trials of the perceptions themselves, and then introspect them.

(2) Spatial Perceptions.

4. Have yourself touched, while your eyes are closed, at various parts of the body. How do you know where you are touched? Introspect very carefully.
5. If you were touched on the wrist and on the chest, and tried (with your eyes shut) to re-touch the places struck, you would get more nearly right on the wrist than you would on the chest. Why?
6. Close your eyes. Let the experimenter take a pair of blunt-pointed drawing compasses, and set the points down evenly upon your wrist, crosswise. If the points are near together, you will 'feel' only one pressure; if they are a certain distance apart, two pressures. The experimenter must alter the distance between the points, little by little; in one series beginning with a distance that clearly gives one, and in a second series with a distance that clearly gives two pressures; until he finds the distance at which oneness passes over into twoness. This distance, averaged from the two series, gives a

measure of your ability to distinguish places upon the skin. — Compare the wrist distance with similar distances upon the forehead, cheek, and back of the neck. What conclusions do you draw from the difference between the distances?

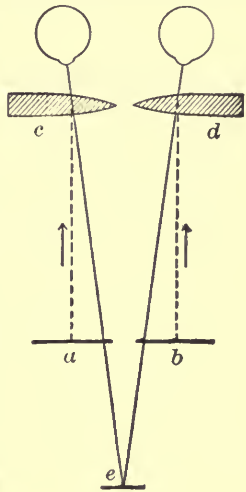

FIG. 12

7. Combine a number of double pictures in the stereoscope. Note carefully how the pictures on the two halves of the slide differ. When you have grown used to the instrument, try to combine simple pictures (the common outline drawings of truncated cones or pyramids) by the unaided eye. Look straight *through* the slide, towards a point beyond it; and move the slide back and forth, until the pictures coalesce. It is a good plan to practise this 'free stereoscopy' with transparent (celluloid) slides; the drawings you can easily make for yourself in ink.

   The Stereoscope (Fig. 12). — Light is reflected to the eyes, along the dotted lines, from the two pictures, *a*, *b*. The reflected rays are so refracted by the prisms, *c*, *d*, that they appear to come from a single point, *e*, lying on the far side of *a*, *b*. Hence we see at *e* a single picture, formed by the superposition of the two pictures, *a* and *b*.

8. Put one of the photographic slips in the drum of the stroboscope and twirl it swiftly, so that you can get the illusion of movement. Then begin again, moving the drum at first very slowly, and later on more quickly; so that you build up the illusion in stages. Notice each stage. — Explain the illusion (*cf.* Experiment 5, p. 51 above).

   The Stroboscope (Fig. 13). — A cardboard drum, *a*, open above, can be twirled upon the handle, *b*. The upper half of the wall of the drum is pierced at regular intervals by vertical slits. The lower half is covered, on the inside, by a slip of paper upon which the separate phases of some movement (the flight of a bird, the gallop of a horse) have been drawn or photographed. As the drum turns, one looks down, through the slits upon the inserted slip.

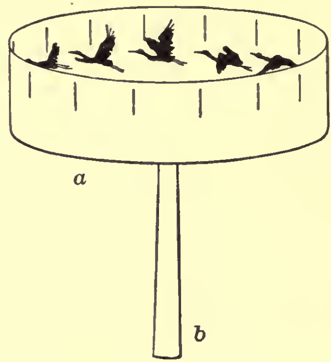

FIG. 13

9. Aristotle suggested the following way of proving that the final appeal in space matters is to the eye. Cross the second over the first finger of your right hand. Place a pencil between the crossed joints. Since, under natural conditions, the outsides of the first and second fingers never touch the same object, the *skin* tells you that two objects are now in contact with it. The eye contradicts the skin; and so strong is the contradiction that you do not even 'feel' the pencil as two objects while your eyes are open.

Now shut your eyes, and let the experimenter put either one thing or two things between your crossed fingers, as he chooses. Not knowing whether you are 'feeling' one thing or two, you cannot appeal to a mental picture. The result is that the skin has its own way, and you soon 'feel' two objects in every experiment, whether one or two be really between your fingers.

N. B. — This account of Aristotle's experiment holds only for those to whom the experiment is new. If you have practised it as a child, you will get the twoness of the pencil at once whether your eyes are open or not.

10. Draw two semicircles, of 1 cm. radius, in the posi-

tion ((. Draw the diameter to the left-hand curve. This seems now to include less space than the other, open semicircle. Why?

11. It is very important to realise the difference between touch-space and skin-space. Take a piece of stiff card, with a smooth edge of 12 cm. Cut pointed teeth along the edge. Estimate the length of the jagged edge, with closed eyes, (1) by passing the finger along the points (touch), and (2) by having the teeth pressed down upon the skin of your fore-arm (pressure). You will think that the card is *longer* than it looks to be, in the first case, and *shorter* than it looks to be, in the second.

(3) Temporal Perception.

12. Shut your eyes, and hold a watch to your ear. See how many rhythms you can throw the ticks into. Write down the forms and accents of the rhythms.

13. Close your eyes. Let the experimenter draw a pencil, at an even rate, from your elbow to the tip of the middle finger. The pencil seems to travel more quickly at some places than at others. Draw a figure of the arm, and mark in the places of apparent slowing and quickening. Explain by reference to Exp. 11, p. 54.

14. Is a purely visual rhythm possible? Is there any other well-marked tactual (one-two) rhythm, besides that of the limbs?

(4) Why is the mixed perception termed an 'assimilation'?

(5) If sensations of taste and of temperature have not the attribute of extent, how do you explain their apparent extensity?

(6) It is said above, § 42, that qualitative perceptions have undergone *less* change than those of space and time. What change have they undergone? How is it that this change has not deprived them of their value?

References

James, *Textbook*, chs. xx., xxi. Sully, *Human Mind*, vol. I., ch. viii. Titchener, *Outline*, §§ 43–51. Wundt, *Lects.*, VIII.–XIII.; *Outlines*, §§ 8–11; *Geom.-opt. Täuschungen*, 1898. See also: Th. Lipps, *Raumaesthetik*, 1897; Sanford, *Course*, esp. pp. 212 ff.

CHAPTER VII

Idea and the Association of Ideas

Idea as reproduction of perception.

§ 50. **The Development of Ideas.** — The ideas of the primitive mind are, as it were, photographic copies, life-likenesses, of the perceptions which go before them. Thus the idea of a landscape would be in part a picture-idea, the look of stream and hills and trees; in part a sound-idea, the idea of splashing water and rustling boughs; in part a tactual idea, the 'feel' of springing grass and moving wind; in part a smell-idea, a remembered freshness and fragrance of air and flowers. The life-likeness is, of course, never perfect: the idea is weaker, passes by more quickly, and is more sketchy, than the perception that corresponds to it: but the qualities of the perception are found again in the idea. *Produced* in perception, they are *reproduced* in idea.

Idea as translation of perception.

This, however, is only the first stage in the development of the idea. The brain-cortex has in most cases a tendency to work more easily at one part than at another. Or — to speak in terms of mental constitution — minds are so constituted that their processes run more easily along certain channels than along others. Hence it happens that those elements in a perception which do not fit in with our mental constitution are very soon dropped out of the idea; the idea is a copy or life-likeness of only a part of the perception. And further, if the nervous tendencies are strongly marked, ideas may cease to be even partial copies of perceptions. Just as we translate words and sentences from one language into another, so may the nervous system translate a perception into more familiar terms, — into an idea which has none of the qualities that were contained in the perception, but replaces them by other and more familiar qualities that mean the same thing.

We describe the differences between minds whose ideas are still at least partial copies of perceptions by saying that they show differences of *memory-type*. Such minds have a preference, so to speak, for a particular kind or type of idea: for picture-ideas, sound-ideas, etc. Minds of the second order, those whose ideas are translations out of the language of perception into an entirely different language, belong for the most part to one or other of the *verbal sub-types*. For the language into which their perceptions are translated is nearly always a language of *words*; their ideas are word-ideas, no matter what the perceptions may have been.

Memory-types and sub-types.

We have now to examine these types and sub-types, in order to see what the ideas are that make up the individual consciousness in each case.

§ 51. **The Four Chief Memory-types.** — The two most highly developed senses are those of sight and hearing. It is natural, then, that there should be minds which are almost wholly eye-minds or ear-minds: eye and ear furnish so many differences of sensation quality that they are able of themselves to represent a great many aspects of the physical world, without calling in help from the other sense-organs.

Visual type. (1) If a mind is of the *visual* or eye type, all its thoughts and memories and imaginations will consist of ideas of sight. If, *e.g.*, an operatic performance is recalled, the scenes will be pictured, and the dress and movement of the performers seen over again; but the music will not be remembered. The sound-parts of the perception have dropped out, and only the sight-parts are left. The mind of the *inventor* is likely to be predominantly of this type: he sees the machine that he is designing, in the mind's eye, before it has been built. (2) If, on the other hand, a mind is of the *auditory* or ear type, its memories will be memories of things heard, and not of things seen. Stage and performers will be forgotten, and only the music remembered. Friends will be thought of not as pictures, figures of a certain appearance clothed in a certain way, but as sounds, as voices or footsteps. The minds of *orators* and of *musical composers* may be of this type. Every one knows the story of the deaf Beethoven's playing, the tears rolling down his cheeks as he heard in idea what he could not hear in outward perception. And it is most useful to the public speaker to be able to hear his coming sentences, with their right ring and emphasis upon them, before he actually delivers them to his audience.

Auditory type.

Tactual type. (3) There is another group of perceptions, — not so rich in sensation qualities as the perceptions of sight and hearing, but still of great importance for our knowledge of the external world, — which furnishes a third memory-type: the *tactual* or (as it is less well called: § 46) *motor* type. Tactual perceptions are made up of the sensation qualities that come to us from skin, muscle, tendon and joint: they are perceptions of hardness and softness, roughness and smoothness, resistance and effort, movement or position of the limbs, etc. It is plain, however, that useful as tactual ideas (life-likenesses of tactual perceptions) may be, a mind made up of them and of them alone will be very much at fault in its thoughts and memories. True, it will be useful for the *inventor* to have the power of 'feeling' in himself the pulls and stresses and strains to which the various parts of his machine must be subject; but he will hardly be able to design the machine unless he can *see* it as well as 'feel' it. So the *orator* may 'feel' his coming sentences; but he will hear them too. Indeed, a mind dominated by tactual ideas, the pure tactual type, is rare. Either it reduces to the verbal sub-type (§ 52), or it is one of the types represented in the *mixed* type which we now pass to consider.

Cooks and confectioners are employing a pure tactual memory when they judge by stirring that a dough or batter has attained the right consistency. But this mode of judgment is confined to a few special cases. Even when one picks out chords or airs on the piano by finger-memory, one is always guided, to some extent, by hearing; the tactual memory is mixed with auditory. This, however, does not detract from the value of the tactual memory; it is, as every player knows, of great importance to the pianist.

(4) The last of the four chief memory-types is the *mixed* type. When a mind is of this constitution, the sensation tendencies of the nervous system are more or less evenly balanced. The operatic performance is remembered in all three ways, as something *seen*, as something *heard*, and as something '*felt*'; **Mixed type.**

stage and performers are visible once more, voice and orchestra are heard again, and the ease or difficulty with which the singers reached their high and low notes is sympathetically revived in one's own throat muscles. This is the most useful memory-type, simply because it gives the most complete account of the outside world, because it reproduces the event thought of under the greatest variety of aspects. But an equal balance of tendencies is rare: even when a mind is to be classed as 'mixed' in type, experiment generally shows that some one side of it (the eye-side, ear-side, etc.) is more strongly developed than the others.

Importance of word-ideas.

§ 52. **The Three Verbal Sub-types.** — We said just now that *words* offer a common language into which all ideas, no matter what their perceptions are composed of, may be translated. Changing the metaphor, we may say that words are the common denominator of all ideas or perceptions, — something in which they may all be expressed.

Every adult mind is made up, to a considerable extent, of word-ideas. We are born into an atmosphere of words; we are talked to from our earliest infancy; we learn to talk in the second year of our life. An intelligent child of two years may have a vocabulary of 300 or 400 words; it is on record that an intelligent child of six may have a vocabulary of 2,000. And there is no experience, however uncommon or overpowering its incidents, which cannot be expressed in words.

The word-idea has three forms: visual, auditory

Verbal sub-types: visual, auditory, tactual.

and tactual. It may be the idea of the word seen, in print or in manuscript; or the idea of the word heard, whether in one's own voice or in that of another; or the idea of the word 'felt,' whether in speaking (felt in the muscles of the throat) or in writing (felt in the muscles of the hand). The ideas of an eye-mind will, naturally, pass most readily into the visual word form; those of an ear-mind into the auditory word form; and those of the tactual mind into one of the tactual word forms. Thus the recollection of the operatic performance, in a word-mind, might be a printed account of the music and acting (verbal-visual ideas); or the sound of a voice describing the performance (verbal-auditory ideas); or the 'feel' of the same voice in the throat (verbal-tactual or verbal-motor ideas).

We take our own way of thinking so much as a matter of course, that it is difficult for us to realise how many different ways there are of thinking the same thing. Hence while some part of the two last Sections will come familiarly to every reader, there will doubtless be other parts which, at first sight, seem almost incomprehensible. A little cross-questioning of friends, however, will probably bring all the types and sub-types to light.

At the same time, it is hardly probable that we ever get, in normal cases, a perfectly pure type or sub-type. The verbal-tactual occurs, perhaps, most frequently in comparatively pure form. The others are always 'mixed' to some degree. Thus the verbal-auditory is usually verbal-tactual as well; and the verbal-visual generally has a trace of the verbal-auditory, and so of the verbal-tactual. The four main types are, then, ideal types only: what happens is that some minds *incline* strongly towards eye or ear or touch memory, and others as strongly to a balance of the partial memories. This complexity of mental constitution is easily understood, when we remember the great complexity of the nervous system, and the large number of sense-channels through which the outside world gains access to consciousness.

Reproduction of smells and tastes is rare.

§ 53. **The Minor Memory-types.** — The ideas of taste and smell are very seldom copies of their perceptions. In the life of primitive man, taste and smell have an important function to discharge (§ 20); and even to-day their sensations and perceptions affect us strongly (§ 25). But as civilisation advances, we depend less and less upon them and more and more upon verbal knowledge, — upon what we read in books on diet, or upon what our physician tells us. Hence life-likenesses of taste and smell qualities are not included, as a rule, in our stock of ideas.

Try to recall the scent of a rose. You have, probably, a picture-idea of the flower, and a tactual idea of the contraction of the nostrils in sniffing. Perhaps you actually do sniff; so that you perceive this contraction, and get sensations of pressure and temperature from the air inhaled. Perhaps, too, the word 'rose' comes to mind, either alone or combined with some other word that suggests the rose scent, — 'attar' or 'essence' or 'perfume.' But the scent itself is, in all probability, not present in the idea.

It is possible that, with continued practice, the power of imaging scents could be regained Oftentimes on entering a room we have an *illusion* of smell: we say, "Don't I smell sandalwood?" or "heliotrope" or what not. This fact seems to show that scents are, even now, occasionally recalled as true smell-ideas, life-likenesses of perceptions. For the most part, however, the power is unemployed, if not lost.

Organic type.

We can hardly speak, then, of a smell-type or a taste-type. On the other hand, the *organic* type is of some importance. There are people who, in recalling an event of their past experience, revive or repeat the internal bodily attitude in which they met the event. It is not that they set to work deliberately to reproduce the 'sinking of the stomach' and heart-beat and internal tremors and quiverings which accompanied the original experience; but rather that, when they recall this experience in the form most natural to them, — visual, auditory, etc., — the internal or organic sensations come up 'of themselves,' in perception, along with the pictures or sounds that stand for the experience in idea.

Signs of organic memory.

We saw in § 25 that the organic sensations enter with quite especial readiness into feelings; *i.e.*, have an especial power of attracting the attention. This trait is clearly shown in the memories of the organic type. If a man is greatly moved when he recounts an experience of many years ago, — becoming angry now as he was then, grieving now as he grieved then, etc., — you may be sure that he has an organic memory, whatever his principal type may be. His anger or grief fastens itself to the revived internal sensations. If, on the other hand, he tells you of his past griefs and angers calmly and coolly, you may be sure that there is no revival of the inward stir-up which took place when they were originally felt; there is no organic memory.

'Affective memory.'

Since organic memory shows itself in a *feeling*, it has been supposed by some psychologists that the feeling-side of the original experience is remembered, and that we should speak not of organic, but of *affective* memory. We have seen, however, that it is impossible to attend to an affection (§ 33); and since we are attentive when we are trying to remember, it is plain that we cannot recall an affection. The affection comes with the organic sensations that make up the 'internal bodily attitude.'

No true organic 'memory.'

It is not perfectly correct, either, to speak of *organic* memory. For the organic sensations are not recalled in idea; they are revived, actually set up again in the body, when the memory pictures or sounds come to mind. Still, they colour the memory; it is very different with them from what it would be without them. Hence we may give organic memory rank as a secondary or minor type, though it cannot be counted with the four chief types of § 51. The organic sensations come up in accordance with the law of the association of ideas, of which we have now to speak.

§ 54. **The Association of Ideas.** — Sensations are welded together, at the bidding of nature, to form perceptions; and the sensations produced by the presence of an object in perception are reproduced in idea. But as the number of perceived objects increases, it must plainly happen that one and the same sensation will be called upon to do duty in more than one perception or idea. The quality of blue, *e.g.*, belongs to water and sky, to certain flowers and birds, to certain earths and rocks, — to say nothing of human productions; it occurs in a vast number of different perceptions. By being used over and over again, in this way, every sensation gets into habits of connection with other sensations; while these, in their turn, form habits of connection with yet others, and so on.

The law of association.

Now it is one of the most important laws of mind that *all the connections set up between sensations*, by their welding together into perceptions and ideas, *tend to persist*. A sensation which has once formed connections with other sensations cannot shake them off and be its own bare self again, — the bare sensation that it was when it entered for the first time into a perception, — but carries its connections about with it; so that whenever it has a place in a consciousness, the connected sensations tend to be dragged in also. This law is the law of the *association of ideas*.

There are various points that we must notice, in regard to this law of association, before we proceed to discuss the two forms of association, the simultaneous and the successive.

(1) Notice that the work of association, the associat*ing*, is done not by ideas but by sensations contained in ideas. A sensation (blue), which is contained in my perception or idea of a lake, is also contained in my idea of M. Bouguereau's picture, "Our Lady of the Angels." When I see or think of the lake, I think of the picture. The ideas are associated: but it is a sensation that does the work.

Sensations associate;

(2) Notice, on the other hand, that although the sensation does the work it is ideas, meanings, that are associated. My idea of the lake does not call up an idea of the blue in the picture, but an idea of the whole picture. The associat*ed*, then, is an idea.

ideas are associated.

(3) Putting these two facts together, we get the ***formula*** of association: *ab–bc*. My lake-idea contains the elements *a*, *b*; my picture-idea the elements *b*, *c*. The sensation of blue is connected both with *a* and with *c*. Hence when I have the perception or idea *ab*, the connection of *b* with *c* tends to persist, and the lake reminds me of the picture.

Formula of association.

(4) In the older psychologies we read of various 'kinds' of association: association by contrast ('giant' suggests 'dwarf'), by similarity ('Dickens' suggests 'Thackeray'), by contiguity ('sea' suggests 'ships,' because the two are seen together), by cause and effect (the riven oak-tree suggests the lightning that struck it), by means and end (the idea of keeping our clothes unspoilt suggests the taking of an umbrella with us when we go out), and so on. It is clear, however, from what has just been said, that these are not 'kinds' of association, — there is only one kind, — but merely forms of it, arranged for convenience under certain heads. Every one of the instances given can be brought under the formula *ab–bc*; the working of the law is the same in each case. We may classify photographs as blue prints and carbon prints and silver prints and platinotypes, as heliotypes and collotypes and stannotypes; but the principle of photography, the fundamental law, is the same for all.

Forms of association.

(5) Notice that the *ab* of the formula *ab–bc* may be a *perception*, though we always speak of the association of *ideas*. It may be the perceived, seen lake that suggests the picture-idea. Similarly, some (though not all) of the elements in the *bc* of the

Perception and association.

formula may be perceived. When a man whose memory is of the visual and organic types is reminded of a past experience by some present perception, the *bc* of the association consists in part of organic sensations actually set up in the body at the moment of recall, — consists, *i.e.*, of a perception.

§ 55. **Simultaneous Association.** — We saw, in the last chapter, that pure perception is very rare in the adult mind. Most of our perceptions are mixed; consist partly of outside and partly of inside sensations. To such a length has the mixture of perception and idea been carried that it is scarcely possible, in some cases, to imagine with any vividness what the original process of perceiving was. We can hardly realise now what the perceptions of place on the skin, of distance in space and of rhythm were in their first formation; our way of perceiving them is a short cut, a jump at meaning, with most of the steps that our forefathers took left out.

Simultaneous association.

The assimilations and symbolic perceptions of our own minds are put together by way of *simultaneous association*. A material object flashes one of its aspects into consciousness in the shape of a sensation. This sensation has fixed habits of connection with other, central sensations. Hence when it arises, they necessarily arise with it. Doubtless, if we knew the truth, they come some small fraction of a second *after* it; but the interval is so short as to be altogether unnoticeable. In practical experience, *when* the sensation comes, it comes with a bevy of inside sensations clustered about it.

Suppose that you are strolling along a country road, and suddenly hear a rumbling noise. You know at once that it is coming from behind you, and that it is the noise of a carriage. You do not turn; but in a few moments, when the noise has reached a certain degree of loudness, you step to the path to make way.

The localisation of sounds. Now sounds do not possess the attribute of extent, and so cannot give rise, directly, to space perceptions. Nevertheless, you seem here to be placing the noise, and placing it accurately, by a direct perception of its distance and direction. What is the explanation?

The fact is that, when the noise takes its place among the processes composing your consciousness, it brings with it a number of central supplements. If you are eye-minded, these are visual; a picture of the carriage, at a particular place upon the road. If you are ear-minded, they are auditory; the sound of the words, "There's a carriage just there, so far behind!" (In this case, the words must have been got from previous visual perceptions; sight has been translated into hearing, into words heard.) If you are touch-minded, they are tactual; perhaps the 'feel' of the same words in your throat, perhaps that of the shrinking of the whole body from imagined contact with the carriage. In reality, then, the noise is perceived as coming from a particular thing and place only indirectly, by way of simultaneous association.

Notice how the *formula* of association is followed in this instance. Some aspect, *b*, of the rumbling noise *ab* has been present in previous perceptions along with *c*, the look of the carriage. Having *ab* now, you necessarily have *bc* also: *b* is so firmly welded to *c* that when *b* comes *c* comes with it.

Verbal association. The commonest and, perhaps, most important of the inside processes that blend with the outside sensation in this form of association are *word*-processes. The first definite idea that a thing suggests to us is generally a word-idea, — the name of the thing. And when the name has been associated to the thing, the association usually stops; the fringe of nascent associates of other kinds fades away; there is no need for their persistence. Words are the common denominator of all perceptions and ideas; so that when we have named an object we have classified it, put it in its place in our stock of knowledge, set it in harmonious relation with our other experiences. When we hear a rumbling noise, upon our country walk, a single word-associate will be enough to 'give us our bearings.' 'Carriage' starting up in consciousness will suggest one line of action; 'thunder' starting up, another. The word stands for so much, symbolises or means so much, that other associates, visual or auditory or tactual, are not required. — Of course, the word-idea will itself take on one of these three forms, according to our memory-type. And, also of course, the word-association is not anything primitive or original, but the final stage of a long process of development.

§ 56. **Successive Association.** — The mixed or symbolic perception is complete in itself. The nervous tendencies of the moment have thrown it up on the crest of the attention-wave: it has been poised there for a little while: now it falls to the lower level, and makes way for another perception or idea. That shares the same fate, in its turn; and so on.

Successive association.

But every one of the sensations contained in the first perception has habits of connection. Hence it is natural that the second should not be wholly independent of the first, but should be built up (again by simultaneous association) on the basis of a sensation contained in the first; that the third should not be independent of the second, but built up, in the same way, on some sensation contained in the second; and so forth. And this is the way in which ideas do, as a matter of fact, succeed one another in consciousness. Whenever we 'let our minds go,' give ourselves up to day-dreaming or reverie or the influence of our surroundings, — whenever, that is, we are passively attentive, — our consciousness consists of a *train of ideas*. Each member of the train is suggested by some member that goes before it; and the suggestion is made by a sensation which is common to the two ideas. The train is put together by *successive association*. **Train of ideas.**

So various are the connections of sensations in the adult mind that one may pass, without a break, from any given idea to any other given idea, — however wide the difference of meaning between the two, — using the sensations that are common to two ideas as stepping-stones. It is easy to pass from the idea of 'water' to that of 'slate'; the sensation 'blue' offers a stepping-stone. And by increasing the number of steps, we can find a way between ideas as different as those of the English civil war of 1642 and the value of a Roman penny.

Thomas Hobbes (1588-1679), perhaps the greatest of English philosophers, has worked out this instance in his *Leviathan* (ch. iii.). "In a discourse of our present civil war," he writes, "what could seem more impertinent [*i.e.*, less to the point] than to ask, as one did, what was the value of a Roman penny? Yet the coherence to me was manifest enough. For the thought of the war introduced the thought of delivering up the king to his enemies; the thought of that brought in the thought of the delivering up of Christ; and that again the thought of the thirty pence, which was the price of that treason. And thence easily followed that malicious question: and all this in a moment of **Instance.**

time,— for thought is quick." So, by finding the common sensation, the link or stepping-stone between idea and idea, we may (to use Hobbes' words) "perceive the way of this wild ranging of the mind, and the dependence of one thought upon another."

A good instance of the train of ideas, held together by successive association, is given by Edgar Allan Poe, in the introduction to his story "The Murders in the Rue Morgue."

Notice how the *formula* of association is repeated in the train of ideas. We have the series *ab–bc–cd–de* . . . ; every pair of links in the chain repeating the type *ab-bc*.

§ 57. **The Physiological Conditions of Association.** — In spite of the multitudinous connections that exist between sensations, it is always some *particular* idea that is suggested by, and always some *particular* group of central supplements that clusters around the present perception. How are we to explain this? Why should association work just in this one way, and not in others?

Let us put the question more concretely. Why should the idea of the English civil war have suggested the delivering up of the king, rather than the idea of the Roman civil war of B.C. 49–45? Why should the name 'Dickens,' a few pages back, have suggested 'Thackeray' rather than the story of *The Wrecker* which the authors, Messrs. Stevenson and Osbourne, acknowledge in their Epilogue to be fashioned after the Dickens pattern? Why should blue water suggest blue slate rather than blue sky or the forget-me-not or the bluebird? Why should the perception of an etched portrait be supplemented in one mind by the name of the person portrayed, Descartes, and in another by the name of the etcher, Edelinck? And so on.

Habit the condition of association.

If we are to sum up the physiological conditions of association in a single word, that word will be *habit*. Habit may be defined as the tendency of a thing to be or do now what it was or did on some previous occasion. The law of habit runs all through nature. Our old coat is comfortable, because it has got into the habit of fitting us; its shape has been gradually changed, by wearing, till it fits our body. New tools do not work so well as old; they have not yet got the habit of working upon them: use adapts them to the materials upon which they are employed. The brain, like everything else, is subject to the law. When two or three parts of the brain have been excited together, in perception, a habit of co-excitation or joint excitation is set up; so that if, later on, one of the parts is excited alone, the others will be involved also, — and involved the more certainly, the more habitual the connection has been in perception. There is thus an *order* of association: a hundred ideas have associations with the given perception, but that idea comes up whose connection with it is most habitual.

Various levels of habit.

There are different strata or levels of habit, in the brain, as there are levels of attention or perception in the mind. Deepest seated are the natural tendencies of the nervous system, the tendencies that we bring into the world with us; and the acquired tendencies, the tendencies that are drilled into us during early education (§ 32). Next in order come the habits that we form in adult life: methods of working, ways of looking at things due to social position and the company of friends, standards of dress and behaviour, etc. Most superficial of all are the habits set up by recent experience; habits which will disappear as the memory of this experience fades.

Thus water may suggest slate because I am a 'born geologist' (natural tendency). The portrait suggests Edelinck because I have been brought up in an artistic home, and have constantly heard discussions of etchings and engravings in my childhood (acquired tendency). Giant suggests dwarf because I have gradually formed a standard of human height and size in my daily intercourse with other men; and both giant and dwarf depart from this standard. Lastly, Dickens suggests Thackeray because I have just been re-reading *Vanity Fair*, while I have not read *The Wrecker* for some three or four years.

Some habits are formed at one stroke.

Most habits are set up slowly, by long-continued repetition. Indeed, this idea of repetition, of doing something over and over again, seems to be essential to the idea of habit: there can be no habit, we should be apt to say, unless there is repetition. Nevertheless, some brain habits are set up all at once, by a sudden wrench; just as we may give a permanent bend to a fencing-foil by one violent lunge. If a dear friend has been drowned on a pleasure excursion, it is probable that we shall never think of boating parties without thinking also of the chance of drowning: the association has become a permanent brain habit, although the connection of boating and drowning in our perception occurred only once.

Questions and Exercises

(1) Work out all the instances of association given in §§ 54–57, showing how they fall under the formula *ab–bc*.

(2) Try to discover your own memory type or types, by the following exercises:

a. Open your mouth a little, and imagine the words *mother*, *bottle*, *trumpet*. If you can imagine them easily, without any inclination to close the mouth, you can think in visual or auditory terms; if you have an irresistible tendency to move lips or tongue, your mind is (partly, at least) of the tactual type. Notice, in the former event, how you do imagine them.

b. Shut your eyes, and form a mental picture of your breakfast table. Can you see all of the table service at once? Can you see the things in their right colours? Does the picture lie out before you, easily comprehended; or must you move your eyes with an effort from cup to dish, from knife to coffee-pot, in order to get a view of the whole? In the latter case, your visual memory is mixed with tactual.

c. Can you recognise your friends directly by the sound of their voices? Or, when you hear the voice, do you have a mental picture of the approaching figure?

d. Can you remember musical airs that you have heard only once? And, if you remember them, do you hear them in your head, or do you 'feel' your throat twitch as they are recalled? Can you imagine the sound of a note that is higher than the highest you can sing? — Determine, from the answers you give, whether your type is auditory or mixed auditory and tactual.

e. What is your method of 'learning by heart'?

f. Can you imagine the tastes of sweet and bitter, without any thought of the sweet or bitter substance, and without any inclination to 'lick your lips' or screw your tongue out of the way? — Can you imagine the scent of violets and the smell of asafœtida, without any thought of the flower or the resin? without any tendency to sniff or to close your nostrils?

g. Think of Deerslayer in the hands of the Mingoes. Do you simply see the scene, or hear or 'feel' the words that describe it, — or do you 'sicken' to think of it, and grow 'breathless' with suspense as hope after hope of deliverance fails?

(3) Perform this experiment in class, or in a company of friends. Let the experimenter choose a list of words which, as pronounced, may mean different things: time (thyme), bow (beau), mind (verb or substantive), sole (of foot, the fish, soul). These he is to read out slowly, each member of the audience writing down what he takes the word to mean, *i.e.*, how it is supplemented in his consciousness by centrally aroused sensations. At the end of the reading, comparisons of results may be made; every one referring his association to some one of the three levels of habit, and reducing it to the formula *ab–bc*.

(4) Perform this experiment in the same way. Let the experimenter write some familiar word on a blackboard, — 'table' or 'saucer' or 'lion' or what not, — and conceal it with his hand or a cloth. At a preconcerted signal he shows the word for 2 sec., and then covers it again. Each member of the audience writes out the first ten ideas suggested by the word seen.

The written list of ideas must be worked over very carefully. (*a*) Write out, by introspection, the precise materials (visual, auditory, etc.) of which the ideas are made. (*b*) Show the dependence of each idea on some foregoing idea, using the formula *ab–bc*. (*c*) Notice that the words you have written down are merely indications of the ideas you actually had, — signs of, perhaps, very complicated processes. And notice that the part of the real idea that the word stands for is the part that you attended to, while you thought: there was a great mass of idea that you did not attend to, did not try to express in the word. Now fill out the gaps, putting down all the interstitial processes that introspection shows you.

(5) Suppose yourself to have been present at the punishment of Hester Prynne, as Hawthorne describes it in ch. ii. of *The Scarlet Letter*. In how many different ways could you remember the event? State what the memory would be, in each case. What, do you suppose, was Hawthorne's memory type? Why?

(6) What is the link or stepping-stone in the following instances of successive association?

abcd	suggests	*efg*
Harvard	"	Yale
"Baby has swallowed a cent!"	"	x-rays
'Tom'	"	'Dick and Harry'
$a + 2b + 3c + \cdots + xn$	"	Hamlet

(7) Is the difference between simultaneous and successive association a difference of degree or a difference of kind?

(8) What advantages would there be in having a memory which was predominantly verbal? What disadvantages?

References

James, *Textbook*, ch. xvi.
Sully, *Human Mind*, vol. I., chs. vii., ix.
Titchener, *Outline*, §§ 52–55, 75, 76.
Wundt, *Lectures*, Lects. XIX., XX.
Wundt, *Outlines*, § 16.

CHAPTER VIII

Emotion

§ 58. **Feeling, Emotion and Mood.**—Sensations blend together to form perceptions and ideas. Perceptions and ideas unite, in their turn, to form still more complicated processes: assimilations, held together by simultaneous association, and trains of ideas, held together by successive association.

Emotion. When a perception or idea is swamped by affection, the result is called a feeling. When a group of perceptions or ideas is swamped by affection, the result is an *emotion* (simultaneous association) r a *mood* (successive association). So we may write the equation:

$$\text{Perception or Idea : Feeling} = \begin{cases} \text{Assimilation : Emotion.} \\ \text{Train of Ideas : Mood.} \end{cases}$$

Feeling simpler than emotion. There are two chief differences between the *emotion* and the simple feeling. (1) The affection in a feeling attaches to a group of *bare* sensations (*cf.* § 54); the affection in an emotion attaches to a group of sensations all of which have already formed habits of connection with other sensations. In different words: the sensation-group in the feeling stands for, means, some *single* object or process of the material world; the sensation-group in the emotion stands for some *group* of objects or processes, for what we call a 'situation' or 'incident' or 'event.' Hence the emotion is *more complex* than the feeling.

Remember that our own body forms part of the 'material world,' in the sense in which we are using this phrase here.

We 'feel tired' or 'hot' or 'thirsty.' Our feeling in these cases reflects a single fact of the material world: the relaxation of our muscles, the high temperature of the surrounding atmosphere, the dryness of our throat. But when we 'feel afraid' our emotion reflects a whole situation: the fearful object before us, our own helplessness, the impossibility of escape, the pain that we shall soon suffer, etc., etc.

Do not be misled by the phrase 'feel afraid' into thinking that fear is a simple feeling: *cf.* § 25.

Feeling weaker than emotion. (2) Since the emotion is a more complex and more serious matter than the feeling, the bodily signs of emotion will naturally be more evident and more pronounced. We shall have the four symptoms of § 26, in an extreme form; but we shall also have new symptoms from other bodily organs or tissues. This general disturbance of the bodily functions gives rise to a mass of internal sensations which, like all of their kind, are strongly affective. So the emotion is intensified: the internal sensations blend with the ideas called up by the situation, and add largely to the pleasantness or unpleasantness of the experience. The emotion is *stronger* than the feeling.

We shall discuss these bodily disturbances in detail in § 60.

Mood. A *mood* is simply an emotion 'long drawn out.' The affection is spread over a train of ideas, instead of colouring a single group of ideas and organic sensations (emotion) or a single cluster of bare sensations (feeling). And, since this train is marginal, not focal, in the series of consciousnesses tinged by the mood (*cf.* Fig. 10, p. 75), it follows that the pleasantness or unpleasantness of the mood at any given moment is much less than that of the corresponding emotion.

§ 59. **How Emotions are Formed.** — Our emotions always come upon us with more or less of suddenness. The stream of perceptions and ideas is flowing on at its usual, everyday level, when suddenly we find ourselves in a certain situation, or are confronted by a certain incident or event, which we cannot but attend to. Two things happen. (1) The situation or event gives rise, naturally, to a perception; and the perception is supplemented, as perceptions usually are, by ideas. Moreover, since we have lapsed into a state of passive attention, this complex assimilation is strongly and vividly *felt;* strong affection is the counterpart of passive attention. Meantime (2) we have faced the situation by a bodily attitude; the bodily disturbances, spoken of just now, are running their course; and the original feeling, strong in itself, is reinforced by all manner of sensations from the internal organs. The emotion reaches its climax in the perfect fusion of the two sets of processes, the complex feeling and the organic sensations. This point passed, it either fades out altogether (as when anger 'quiets down'), or changes into its opposite (as when fear gives place to relief), or subsides into the less violent and more lasting mood (as when joy becomes a steady cheerfulness).

The emotion is a complex feeling, whose core is an assimilation, and which contains also a mass of organic sensations.

An emotion is formed, then, when (1) our current train of thought is interrupted by (2) an assimilation, which is keenly felt, and which (3) is made still more keenly affective by the addition of a mass of organic sensations.

Shakespeare has given us an illustration of the forming of an emotion (the emotion of chagrin) in *King Henry VIII.*, iii. 2.

The emotion of chagrin.

Wolsey is 'moody,' 'discontented,' 'vex'd,' at the idea of the King's marriage with Anne Bullen. His plans are interrupted by Henry's infatuation.

> "Anne Bullen! No; I'll no Anne Bullens for him . . .
> I know her for
> A spleeny Lutheran; and not wholesome to
> Our cause" . . .

The emotion shows itself in external bodily disturbances:

> "Some strange commotion
> Is in his brain: he bites his lip and starts;
> Stops on a sudden, looks upon the ground,
> Then lays his finger on his temple; straight
> Swings out into fast gait; then stops again,
> Strikes his breast hard; and anon he casts
> His eye against the moon; in most strange postures
> We have seen him set himself:"

many of which are the signs of internal bodily disorder, and all of which supply sensations to reinforce the central feeling.

The bodily signs of emotion:

§ 60. **The Bodily Expression of Emotion: Trunk and Limbs.** — We saw in § 26 that there are four bodily signs of the presence of affection in consciousness. We have now to ask what are the bodily signs of the presence of an *emotion*, what sort of physiological processes are aroused when we confront a situation.

(1) the four signs of affection;

(1) Since emotion is an affective process, the bodily signs of joy or grief, anger or fear, will include the bodily signs of affection in general. We have changes of pulse and breathing, of muscular strength and of the volume of the body. And these changes are of opposite kinds, according as the emotion is pleasant or unpleasant.

(2) disturbances of glands and involuntary muscles

(2) Since, however, the emotion is a more complex and more serious matter than the feeling, we shall expect to find still further bodily disturbances. We

find, as a matter of fact, disturbances of the organs of secretion (tear glands, sweat glands, etc.) and of the other involuntary muscles besides the heart.

These disturbances are very marked in the emotion of *fear*. The following account of them is pieced together from the description given by Darwin in his classical work *The Expression of the Emotions in Man and Animals*. (*cf.* Darwin's description of fear);

"That the skin is much affected under the sense of great fear, we see in the marvellous and inexplicable manner in which perspiration immediately exudes from it. This exudation is all the more remarkable as the surface is then cold. The hairs also on the skin stand erect; and the superficial muscles shiver. The salivary glands act imperfectly; the mouth becomes dry. As fear rises to an extreme pitch, the intestines are affected. The secretions of the alimentary canal and of the kidneys are increased."

Here we have a disturbance of several glands (sweat glands, salivary glands, etc.), and of the involuntary muscles lying just beneath the surface of the skin (hair standing on end, shivering and goose-flesh).

(3) Again: the emotion is not so personal and subjective (§ 27, 2) an experience as the feeling. It arises only when we are facing a set of circumstances that have intruded upon an existing consciousness, when we are confronting a situation. Naturally, then, there will be some aspects of its bodily manifestation that refer to the circumstances, to the situation. The bodily changes will show us, not merely that the man is strongly affected, but that he is strongly affected by some particular incident, in some particular way. (3) weakened survivals of once serviceable actions;

Light is thrown upon the matter by certain facts of biological evolution. In the struggle for existence, those animals have survived which took unexpected events in the best manner. So it is an ingrained habit of the nervous system that leads the deer to run when it hears the noise of the hounds, the sitting bird to crouch down upon the nest at the approach of an intruder. Habits of this sort die hard. If we men do not run, we do 'jump' when we are startled; if we do not crouch down, we do 'wince' when we are afraid. The jump and wince, that is, are bodily signs of emotions (alarm, fear): they are relics of actions which were of great service to our animal ancestors in confronting a situation, and which have persisted in man, in weakened form, just by sheer force of habit.

[Emotion an instance of fusion.]

The sensations set up by these bodily disturbances colour the whole emotion, very much as overtones colour the note of a musical instrument, making it a piano note, a violin note, etc. (§ 42). The mass of ideas and sensations is blended together to form one mental whole, *an* emotion; just as noises, tone and overtones blend to form *a* note. And just as the unskilled ear takes a note to be a simple (sensation) process, so may unskilled introspection take emotion be a single, simple process.

So important are the organic sensations for emotion that, if they happen to appear of themselves, they may easily bring the emotion with them. When Deerslayer caught the tomahawk hurled at him, "his hand was raised above and behind his own head, and in the very attitude necessary to return the attack. It is not certain" — notice this sentence — "whether the circumstance of finding himself in this menacing posture and armed tempted the young man to retaliate, or whether sudden resentment overcame his forbearance and prudence." Cooper has realised the undoubted fact that, given the attitude, the emotion might come of itself (*Deerslayer*, ch. xxvii.).

(4) play of feature.

§ 61. **The Bodily Expression of Emotion: Face.** — (4) But, after all, the principal sign of emotion in man is the look of his face. Sometimes it is the eyes that show emotion; we open the eyes widely, *e.g.*, when we are surprised. Sometimes it is eyes and nostrils together; think of the frown and the movement of the nostrils in anger. Sometimes, again, it is the mouth; the injured man seems to be tasting something bitter, the disappointed to be tasting something sour, the flattered to be tasting something sweet. How are we to account for all these 'looks'?

Anger

The look of anger is finely described in *King Henry V.*, iii. 1:

> "Then lend the eye a terrible aspect;
> Let it pry through the portage of the head
> Like the brass cannon; let the brow o'erwhelm it
> As fearfully as doth a galled rock
> O'erhang and jutty his confounded base
> Swill'd with the wild and wasteful ocean.
> Now set the teeth, and stretch the nostril wide;
> Hold hard the breath, and bend up every spirit
> To his full height!"

Some of them fall under the law of habit that we have just discussed. It is useful for the surprised animal to have a wide field of view; and for the angry animal to have his sight focussed on his adversary, and to draw deep breaths for the combat. So these looks have persisted, in weaker form, as signs of human emotion. The others, however, — the sweet and sour and bitter expressions, — require a more elaborate explanation, which takes us back to the primitive days of our race.

Explanation of play of feature: primitive language was metaphorical

Primitive language is full of what we should call metaphor. Our forefathers could not speak glibly, as we do, in abstract terms; when they wanted to say that a thing was black they said it was scorched, — when they wanted a word for soul they called it breath. So when they needed to tell their comrades about the circumstances that had called up an emotion, they were unable to put the circumstances in adequate words; they gave a partial, metaphorical account of what had happened.

The one thing necessary in a primitive society is food; and primitive metaphors are naturally, to a large extent, metaphors from the preparing and obtaining of food, from cooking and hunting. Hence the first ideas that came into a man's mind under pleasant circumstances might very well have been ideas of sweet things, and the first ideas that came under unpleasant circumstances, ideas of sour or bitter things. Wishing to say that his hunt had been successful, he said that it had been sweet; wishing to say that it had been unsuccessful, he said that it had been sour or bitter.

and eked out by gesture.

Again: primitive language was largely a gesture-language. Since the spoken words gave only a partial account of the event described, they were eked out by movements of hand or feature. And foremost among these movements were the movements that corresponded to the *metaphor*. The successful hunter actually licked his lips, and seemed to suck a sweet morsel; the unsuccessful drew his lips out sideways, as if he were trying to taste as little as possible of his sour draught.

The metaphor has been lost; the gesture persists,

Now we begin to see where the argument is taking us. Certain processes in the emotion (in the complex of sensations, set up by the situation, that forms the basis of the vivid feeling) suggest a metaphor, by simultaneous association; and the metaphor brings a movement with it. As language developes, the metaphor is lost: it is no longer necessary. But the movement persists. When the emotion comes, the movement comes with it. The movement survives, partly because of its intrinsic fitness to communicate to others a knowledge of our emotion, and partly because gesture cannot change as language does. The connection of the metaphor with the feeling, and the connection of the movement with the feeling are, at first, equally strong; both strong enough to last into our civilised life. But the metaphor has been driven away by new words, while the gesture has not been driven away by new movements. Hence when we are feeling hurt we at once 'look bitter'; the gesture comes immediately to express our emotion, without there being any hint of the metaphor.

The following Table will show the reader, at a glance, how the various bodily signs of emotion have been developed, and how they are related to one another.

(1) Change of pulse, breathing, volume and strength.

(2) Extension of (1) *within* the body, due to the greater intensity of the emotion: change in secretion and in contraction of the involuntary muscles.

(3) Extension of (1) to the *outside* of the body, due to the need of meeting the situation by the right attitude: change in position, movements of limbs and features.

(4) Certain sensations in the emotion call up a metaphor, and the metaphor calls out movement of features. Then the metaphor drops out; but the play of features remains associated to the sensation-processes in the emotion.

Names of emotions are of practical, not of scientific importance.

§ 62. **The Classification of the Emotions.** — Very many attempts have been made to classify the emotions, to group them in accordance with some principle which should show their genesis and relationship. No attempt has been altogether successful. This is not to be wondered at, however; for language has been shaped by practical needs, not by scientific requirements. The emotions that are important in everyday life, those set up by important events or events that every man is called upon to face in the natural course of life, — these emotions have received names. But there must be many others, whose practical import is less or whose shades of difference are so slight as to escape the notice of the ordinary observer, that have never been named. Hence any list that we may make will, of necessity, be incomplete and badly balanced.

Two groups of emotions.

We can, however, divide the emotions into two great groups, according as the situation reflected by them is reflected under the aspect of *quality* or under that of *time.* It may be the circumstances of our predicament that affect us, the actual facts of the event: then we have a qualitative emotion. Or it may be the length of time that the situation lasts, or the order in which things happen: then we have a temporal emotion. We will take the two groups in order.

Emotions of quality.

§ 63. **Qualitative Emotions.** — All these emotions are either pleasant or unpleasant; the situation is either agreeable or disagreeable. Further: each of them has two forms, according as we lay stress upon the situation (objective form) or upon our own attitude to the situation (subjective form), — according, that is, as we think more of the facts or more of ourselves, who are experiencing the facts. And further: each of them may show different degrees of intensity, ranging from the violence of passion to the subdued calm of the mood.

We may now proceed, working along these three lines, to make out a list of the chief qualitative emotions. The names of pleasant emotions are printed in capitals.

List of qualitative emotions.

The most general forms of emotion are JOY and sorrow, LIKE and dislike. It will readily be seen that the first pair are more personal, more subjective, than the second; we *feel* joyful or sorrowful, but we like or dislike some *event*, — the conduct of some person, or the appearance of some object.

LIKE and dislike take on different forms, again, according as their object is personal or material. When they refer to persons, they become SYMPATHY and antipathy; when they refer to material things, ATTRACTION and repulsion.

We have, then, as our cardinal emotions:

Subjective:	*Objective:*	
JOY, sorrow	LIKE, dislike	
	(*of persons*)	(*of things*)
	SYMPATHY, antipathy	ATTRACTION, repulsion;

and can base our Table on this fourfold foundation. The more objective forms are printed in italics. Where there are different names for different degrees of intensity of the same emotion, the names are given in the order weaker to stronger: thus 'wretchedness' is stronger than 'melancholy.'

	Emotions	Moods
(1)	JOY	cheerfulness, hilarity
	Sorrow, grief: *care*	*anxiety*
	Sorrow, grief: melancholy, wretchedness	dejection, gloom, depression

(2) LIKE		content
Dislike	*hate*	*annoyance*
	loathing	discontent
(3) SYMPATHY (for others)		
	friendliness, affection, love	kindliness
SYMPATHY (for oneself or others)		
	anger, wrath	*retaliation*
	contempt	superiority
Antipathy	*aversion*	*irritability*
	chagrin, mortification, exasperation, rage	sulkiness
	resentment, baffled anger, impotence	vexation, soreness
(4) ATTRACTION, delight		happiness, *charm*
Repulsion	*repugnance, horror*; disgust	dissatisfaction

Notice that there are more words for unpleasant than for pleasant emotions; so that the Table wears a ragged, unbalanced look. Notice, too, that the words do not all seem to fit into the places assigned them; so that you would yourself, perhaps, make out the Table differently. Both these facts show that the names for emotions were meant to serve only a rough, practical purpose, and that it is impossible to arrange them in a strictly scientific way.

It is a matter of common experience that some men are moved by events which leave others unmoved (*cf.* §§ 24, 53). Hence language has coined names for what we may call 'moods of indifference.' Indifference to joy and sorrow is *composure;* to like and dislike, *unconcern;* to sympathy and antipathy, *apathy;* to attraction and repulsion, *insensibility.*

The reader may think it strange that anger is classed under sympathy, and so made a pleasant emotion. The anger here meant, however, is 'generous anger,' 'righteous indignation'; the anger that we feel when we see an animal cruelly treated, or believe ourselves to have been unfairly used. In such cases we 'feel strong' and breathe deeply; such anger is pleasant.

But anger that is mixed with hate or envy, and anger that is checked by the feeling of weakness, by the idea that we cannot do anything to prevent the wrong, — such anger is unpleasant.

We shall say a word upon the question of 'higher' and 'lower' feelings in § 96.

§ 64. **Temporal Emotions.** — The temporal emotions, like the qualitative, are always either pleasant or unpleasant. Depending as they do, however, upon the course of time, they are constantly tending to pass into other and more stable forms. Just as discords, in music, are always transitional, and must be 'resolved' upon a concord, so the temporal emotions are transient in nature, and must be 'resolved' upon qualitative emotions. Like the latter, again, they show differences of intensity, and may be classified as objective and subjective.

Emotions of time.

It is usual to regard *expectation* and *surprise* as the two fundamental temporal emotions. Really, however, these terms denote states of consciousness, not emotions. Expectation is simply an anticipatory attention, — attention to the idea of something which is to happen in the future. Surprise is attention to an idea that is suddenly presented, and that differs from the ideas forming the consciousness of the moment. — In actual experience, expectation and surprise are always either pleasant or unpleasant. Looked at as affective processes, they are rightly classed with the emotions: in that case, however, they are no longer called expectation and surprise, but receive other names. In themselves, as states of consciousness, they are no more emotions than attention is.

Expectation and surprise

The following Table shows the *relations* of the temporal emotions to one another, and to the abstract states of expectation and surprise. It is not a Table of origins: thus, PLEASED SURPRISE need have no antecedent fear or HOPE; and the fear or HOPE, if it does precede, need not itself spring from a HOPE or fear delayed. The three emotions are, however, *connected* in the manner indicated.

List of temporal emotions.

HOPE			[Expectation]	FEAR		
(fulfilled)	(unfulfilled)	(delayed)		(fulfilled)	(unfulfilled)	(delayed)
SATISFACTION	Disappointment	Fear		Alarm	RELIEF	HOPE

[Surprise]

(suddenly fulfilled)	(suddenly destroyed)	(suddenly destroyed)	(suddenly fulfilled)
Unpleasant Surprise	PLEASED SURPRISE	Unpleasant Surprise	PLEASED SURPRISE
(becomes Alarm)	(becomes RELIEF)	(becomes Disappointment)	(becomes SATISFACTION)

SATISFACTION and disappointment, alarm and RELIEF, are the qualitative processes upon which the temporal are 'resolved.'

Continuing the Table, on the pattern of the list of qualitative emotions, we have:

(1)	HOPE, eager anticipation . . .	sanguineness
	Fear { *terror*	*uneasiness*
	Fear { dread	apprehension
(2)	SATISFACTION. abundant satisfaction	equableness
	Disappointment, despair . . .	sourness
(3)	SURPRISE / Surprise } astonishment, amazement . . }	wonder
(4)	RELIEF	confidence
	Alarm . . .	vague discomfort, consternation

The order of emotive development.

There can be no doubt that the emotions of these Tables belong to various stages or strata of mental development. It is, however, very difficult to arrange them in the order of their first appearance. The earliest emotions are probably a vague joy and a vague sorrow; indefinite hope and fear; and pleasant and unpleasant surprise. These are all seen in very young children. Next come, perhaps, anger, specialised fear (fear of something definite), affection (fondness for someone or something), etc. The emotions are getting to be a little more objective, a little further removed from the simpler feeling. At a third level come sympathy (as friendliness), and still more specialised and objective forms of the other emotions.

Are emotions ever pleasant and unpleasant at the same time?

§ 65. **Mixed Feelings.** — We came to the conclusion in § 27 (1) that "two opposite affections cannot ever be in consciousness together." The total feeling of a given moment must be *either* pleasant *or* unpleasant; it cannot be both. Yet we find many references in poetry and fiction to 'mixed feelings,' emotions that are at once pleasant *and* unpleasant. When Shakespeare makes Desdemona say:

> "Something, sure, of state . . .
> Hath puddled his clear spirit; and, in such cases,
> Men's natures wrangle with inferior things,
> Though great ones are their object. 'Tis even so;
> For let our finger ache, and it indues
> Our other healthful members ev'n to that sense
> Of pain:" —

the passage is entirely in agreement with our previous statement: Othello is vexed, apparently, by state affairs, and consequently speaks harshly to his wife, — just as the unpleasantness of a finger-cut puts us in a generally uncomfortable and irritable frame of mind. On the other hand, Juliet says:

> "Parting is such sweet sorrow
> That I shall say good night till it be morrow": —

as if there were such a thing as a joy-sorrow emotion; and in *King John* we have this dialogue between Philip and Constance:

> "*K. Phi.* You are as fond of grief as of your child.
> *Const.* Grief fills the room up of my absent child,
> Lies in his bed, walks up and down with me,
> Puts on his pretty looks, repeats his words, . . .
> Then have I reason to be fond of grief:" —

as if, again, there were such a thing as a pleasant grief, an emotion that should be at the same time pleasurable and unpleasurable. How are we to account for this seeming contradiction?

Hume's answer:

The question of the existence of mixed emotions is an old one in psychology. It is raised, *e.g.*, by David Hume (1711–1776) — who has been called the "most subtle metaphysician of Great Britain" — in his work *A Treatise of Human Nature.*

"There may be started," says Hume, "a very curious question concerning the contrariety of passions [emotions], which is our present subject. 'Tis observable, that where the objects of contrary passions are presented at once, it sometimes happens that both the passions exist successively, and by short intervals; sometimes, that they destroy each other, and neither of them takes place; and sometimes that both of them remain united in the mind."

The instance given of a quick alternation of pleasurable and unpleasurable emotion is this:

"When a man is afflicted for the loss of a law-suit, and joyful for the birth of a son, the mind, running from the agreeable to the calamitous object, with whatever celerity it may perform this motion, can scarcely temper the one affection with the other."

That is, there is a see-saw of joy and sorrow, according as the situation confronted is that of the loss of the suit or the birth of an heir. As an instance of the mutual destruction of emotions, we might suppose that, of two equally important law-suits, the one was lost and the other gained on the same day: the balance of joy and sorrow might result in the mood of indifferent composure. Lastly, for his instance of united contraries Hume has recourse to the temporal emotions. Noticing how hope and fear change as the 'degree of probability' of the hoped or feared event changes, he writes: "The passions of fear and hope are mixtures of grief and joy."

Hume's statement of the question is entirely correct. We are often called upon to confront two situations, the one of which would of itself arouse joy, and the other sorrow. But when this happens there are two, not three possibilities. Either the emotions cancel each other (the two law-suits), or there is a rapid see-saw of the attention between the situations (law-suit and birth of son, event hoped and event feared). Hume has noticed the difference between such emotions as hope and fear, on the one hand, and joy and sorrow, on the other: but instead of placing them in different groups, as qualitative and temporal, has tried to explain the temporal as mixtures of opposite qualities. Really, the only sense in which we may use the phrase 'mixed emotion' is that in which Professor Sully speaks of it, when he writes: **which is partly right, and partly wrong.**

"A tangle of agreeable and disagreeable associates results in a mixed emotion, in which now the pleasurable, now the painful factor is uppermost."

Juliet is alternately glad and sorry; sorry to part from Romeo, but glad that he is there, as her lover, and glad in the thought of seeing him again. Constance cannot but think of Arthur (passive attention). Thinking of him as he was, she is proud and joyous; then, as his loss comes home to her, her grief is all the more bitter.

For another instance of mixed emotion. *cf. Antony and Cleopatra*, I. ii. 174: "This grief is crowned with consolation."

§ 66. **Temperament.** — It is usual to distinguish four types of affective mental constitution, four 'temperaments.' Minds of different temperament differ in two **The four temperaments.**

ways: in the *rapidity* with which thought follows thought in the 'train of ideas,' and in the *strength* of the affection which colours these thoughts. The temperaments are named as follows:

	Quick Thought	Slow Thought	
Strong Affection	CHOLERIC	MELANCHOLIC	Temperaments
Weak Affection	SANGUINE	PHLEGMATIC	

History of the doctrine of temperaments.

The history of the doctrine of temperaments is one of the most interesting chapters in the history of psychology. It was a principal tenet of the old-world physicians — a tenet ascribed to the great Hippocrates, the father of medicine (B.C. 460–? 375) — that the human body contains four humours: blood, phlegm, yellow bile and black bile. And it was a principal tenet of the physicists that there are four elementary qualities of things: wet, dry, hot and cold. Another famous physician, Galen (A.D. ? 130–? 200), drew up a Table of temperaments on the basis of these four qualities and four humours, — paying more regard to the former, however, than to the latter. In the further progress of medicine Galen's list was much simplified, and the humours came to the front again; each humour giving its name to a temperament. So we have:

Mixture of Elements	*Humour*	*Temperament*	
warm-dry	yellow bile	choleric	(Gk. *chole.*)
warm-wet	blood	sanguine	(Lat. *sanguis.*)
cold-dry	black bile	melancholic	(Gk. *melas*, black.)
cold-wet	phlegm	phlegmatic	(Gk. *phlegma.*)

The hot is the quick, the cold the slow element; dryness and moisture correspond to strong and weak feeling respectively. But it was some time, even after the names of the temperaments were settled, before they were defined exactly as we define them to-day. The melancholic was the first to be accurately characterised; then the choleric was sharply differentiated from it; and the sanguine and phlegmatic recognised last of all.

It is but rarely that modern fiction gives us a delineation of a pure temperament; the complexity of modern life has brought with it a corresponding complexity of character. At the same time, most standard novels show us approximations to pure temperaments, especially among the minor figures of the tale. Thus in *The Newcomes* Thackeray has drawn Madame de Florac as melancholic, and Fred Bayham as choleric. Mrs. Hobson Newcome is sanguine; and Rosey, with her five songs and her dulness to Warrington's jokes, with her unmoved acceptance of her mother's anger and her uncle's death, is a good instance of the phlegmatic temperament.

Questions and Exercises

(1) Describe eight situations which might give rise to the eight cardinal emotions.

(2) What emotions have you seen shown (*a*) by babies and (*b*) by dogs? Why should a young child have but few emotions?

(3) Professor Wundt, noting that one word is often used to designate very different forms of emotion, distinguishes six kinds of anger:

(*a*) a *weak* kind, a *strong* kind, and a kind that is alternately weak and strong;

(*b*) a kind that comes to a head *slowly*, a kind that arises very *quickly*, and a kind that comes in waves, *intermittently*.

He further says that the bodily signs of anger may be those that we have found in pleasurable emotions, those that we have found in unpleasurable emotions, or an alternation of both sorts.

Can you think of situations that would call forth all these different forms and expressions of anger? Is it strictly correct to call the emotion 'anger' in every case? In which of the cases does the 'anger' differ from the anger of § 63?

(4) Fig. 14 gives the facial expression of two opposite emotions, as suggested by the natural philosopher and artist Leonardo da Vinci (1452–1519). What are the emotions? Can you give any reasons for their being expressed as they are?

(5) Man betrays emotion most readily by movement of the lips. How do dogs and horses betray it? Can you give any reason for the difference between the emotional expression of these animals and of man?

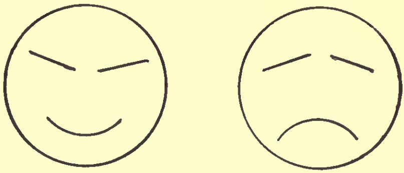

FIG. 14

(6) How would you explain the following expressions of emotion or mood? —
   (*a*) Sorrow: features are lengthened, 'face falls.'
   (*b*) Sulkiness: lips protrude, in 'pouting.'
   (*c*) Superiority: upper lip curls, so as to show teeth, in 'sneering.'
   (*d*) Contempt: eyes are half closed.
   (*e*) Contempt: fingers are snapped.
   (*f*) Disgust: nose wrinkles and 'turns up.'

(7) One of the old Greek philosophers, Democritus, said that the heart was the organ of anger. What facts could have led him to take this view? Are there any phrases in our own language that point to a similar way of thinking about anger? And about other emotions than anger? [*H.*, 55.]

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CHAPTER IX

The Simpler Forms of Action

§ 67. **Movement and Action.** — When we were discussing attention and emotion, we found it necessary to describe (§§ 34, 60, 61) certain bodily movements which accompany or 'express' them. We were interested in these movements not for their own sake, but for the sake of what they signified or expressed. We found that, seeing a particular set of movements, we could say: "That man is attentive!" — and, seeing another set: "That man is afraid!" We were arguing, so to speak, from outside inwards; from movement to the mental processes that movement stands for.

Movement as a psychological phenomenon.

We have now to look at movement from a different point of view, to ask what movement *is*, on its psychological side. We must examine it for its own sake, working from inside outwards, — that is, trying to find out the psychological conditions under which movement in general takes place. For it is clear that movement is of the very highest importance in mental life. We are constantly 'doing' something; hoping, fearing, wishing, avoiding, resolving to do something, and feeling glad, sorry, satisfied, relieved that the something is done. What, now, is the problem that 'doing' things sets to psychology?

Let us take two instances of bodily movement, and see how they help us to answer this question.

The movements of swimming.

(1) Suppose that you have recently learned to swim, and that you wish to test your endurance in the water by swimming from one boat or dock to another. You hesitate a little; but finally resolve to make the trial, and dive in. As you swim, you 'feel' the resistance of the water; you exert yourself, and grow tired; the water seems to get thicker and thicker, and your body to become heavier and heavier, as you near the goal. — In this case, the movement has a double claim upon the psychologist. In the first place, it has a mental *antecedent;* the idea of the distance, the hesitation, the final resolve, — all these complex mental processes precede it: they are the mental circumstances under which it occurs, its 'conscious conditions.' In the second place, it has mental *concomitants;* the perception of resistance and the tiredness come at the same time with the moving.

Heart-beat.

(2) Now consider, by way of contrast, the movements of your heart. They go on of their own accord, without any antecedent resolve; and they go on for the most part unnoticed, without any concomitant sensations. You can perceive them by purposely attending to them; and you perceive them when you are angry or 'out of breath'; but under ordinary circumstances they are not 'felt' at all.

Action.

A movement that has mental antecedents (conscious conditions) and mental concomitants is termed an *action;* and the problem which 'doing things' sets to psychology is that of tracing out the various sets of processes which can serve as the conscious condition of the various forms of action. Movements of the second kind (of heart, lungs, blood, intestines, etc.) are termed 'movements' simply. They have no place in psychology as movements, for their own sake: we have to take account of them only when (1) they are the bodily conditions of organic sensations (§ 21), or when (2) they 'express' particular mental processes (feeling, emotion). Looked at as movements, there is nothing about them for psychology to lay hold of; we either do not perceive them at all, or merely perceive the sensations aroused by them while they are actually performed.

§ 68. **The Conscious Condition of Primitive Action.** — The one thing necessary for action, in the mind of the primitive organism, was *attention*. When the animal's attention was caught by an object, no matter what the object might be, it moved: moved *towards*, if the object affected it pleasantly; moved *from*, if the object were unpleasant. In other words: every time that a complete consciousness was formed, — a consciousness, that is, consisting of (1) an idea (2) attended to and therefore (3) felt, — there was corresponding movement of the whole body.

Attention the prime condition of action.

We call this consciousness a 'complete consciousness' because it contains both of the mental *elements*, sensation and affection, and contains them in the form of *concrete* processes (idea and feeling) running their course in the *state* of attention. All the requirements of a full consciousness are thus met. In the interval between two attentions, the primitive consciousness was composed of a vague blur of what we must term organic sensations, with no reference to the world outside of the body.

There are three points to observe here.

Notice (1) that action affords a good illustration of the statement made in § 38 that "mind developes in close interaction with

Mind and nature.

nature." There is a physical or natural side to the phenomenon that we are considering from the psychological side. When a full consciousness is formed (psychology), then the animal moves (physics or biology). And the appropriateness of its response to different stimuli is an expression of the law that all perceptions must possess a *meaning*.

The function of a nervous system.

(2) We can now understand how it is that all nervous systems are constructed on the same plan. The function of a primitive nervous system is simply to *take in* and *send out:* what comes in as impression goes out into movement. The function of a more highly developed nervous system is to *take in*, to *work over*, and then to *send out:* what comes in as impression still goes out into movement, but does not go out immediately; the incoming excitation is worked over at the centre of the system, and sent out perhaps into movement of the whole body, perhaps into movement of a limb or part of a limb, perhaps into movement of the internal bodily organs, of heart and blood, etc. The principle of the nervous system is the same, but its working has grown more complicated. A famous neurologist, Dr. Hughlings Jackson, sums up the functions of the brain by saying: "All nervous centres, from the lowest to the very highest, are made up of nothing else than nervous arrangements representing impressions and movements. I do not see of what other materials the brain *can* be made."

Why psychology came late to the study of attention.

(3) We can understand, also, how it comes about that in the older works upon psychology *attention* is not discussed, as a state of consciousness that has special features and special conditions, but is simply taken for granted. We may be sure that no object of the world outside the body would be perceived by the primitive organism that was not at the same time felt (attended to). The natural or normal perception is the perception given in the state of attention; indifferent perceptions, perceptions of objects not attended to, are a later growth, the result of the multiplication of sense-organs and of the consequent complexity of consciousness. So we ourselves, when we think of a sensation — 'blue' or 'sweet' — naturally think of it as it is when we attend to it. The older school of psychology had not passed beyond this 'natural' attitude to sensations and perceptions, and therefore took attention for granted.

Do not suppose that the primitive consciousness was split up, as clearly and sharply as ours is, into a sensation-side and an affection-side. We, looking back over the history of mind, can see that sensation and affection were both represented in the very earliest mind; but none the less that mind was a one-tissue mind (§ 48), a mind whose processes were neither sensations nor affections, but rudimentary sensation-affections.

The conscious conditions of a particular action are usually summed up in one word, — the word *motive*. Thus the motive to the primitive action that we have just been considering would be the felt (attended to) perception of an object. It is evident, from this single illustration, that every motive may be looked at from two different points of view: stress may be laid upon its sense-side (the perception) or upon its affective side. When we are thinking of the former, we speak of the *inducement* to act; when we are thinking of the latter, the pleasantness or unpleasantness of the inducement, we speak of the *incentive* to act. The whole motive, the sum of conscious conditions, is made up of an inducement and an incentive, present in consciousness together. Thus a thief is induced to steal by the sight of a loaf; the incentive to the theft is the unpleasant feeling of hunger.

Motive is made up of *inducement* and *incentive*.

The typical motive to human action, the motive from which all others may be derived, is called *impulse*. We proceed now to discuss the impulse in detail, and shall then treat of three degenerate forms of impulsive action, — instinctive action, ideomotor action and reflex movement.

Impulse.

§ 69. **Impulse: The Idea of Own Movement.** — Suppose that an organism has moved, under the condition described in the foregoing Section, the condition of *attention* or (for we saw that the two expressions were in this case identical) of a full consciousness. When the movement is over, the animal will have

Formation of the idea of one's own movement.

had a new perception, and so have laid the foundations of a new idea, — the perception or idea of *its own movement*. When next it attends, this idea of own movement will be simultaneously associated to the perception of the object attended to: the animal will attend not merely to the object, but to the object *plus* the idea of own movement. And as the association of perception-of-object and idea-of-movement is strengthened by every instance of actual movement, — every time that the animal moves, it experiences anew the perception of own movement, — this idea comes to play a very important part in the mass of idea and feeling that makes up the conscious condition of movement in general.

Function of this idea.

For remember what the very earliest movement was: just a rough, unregulated movement towards or away from an object. It is a far cry from movements of this sort to the precise, definite, accurate movements that *we* make; such movements as those of picking up a pin, or counting out money, or writing, or using knife and fork. Now the idea of previous movement gives the organism a pattern or copy of movement, — a copy to be closely followed, if it be the idea of a satisfactory movement, and a pattern to be avoided, if the original movement proved unsatisfactory. We may say, then, that when the *idea of past movement* comes to be contained in the conscious conditions of action, action is on its way to be precise and accurate.

Composition of motive.

If we sum up the conscious conditions of action at this stage of mental development, we have:

(*a*) Perception of object;

(*b*) Idea of own movement, connected with the perception by way of simultaneous association;

(*c*) Affection accompanying the perception and idea. Since the complex which the affection colours is a group of processes held together by simultaneous association, the whole sum of conditions will be of the nature of an *emotion* (§ 58). This means that there will be a fourth factor in the list:

(*d*) Organic sensations, set up by the bodily expression of the affection.

Instances of motives. We will work out these conditions, in two actual cases. The one shall be a case of impulse *towards*, the other a case of impulse *away from*.

(1) Suppose that an animal perceives, by sight or smell, the near presence of *food*. It moves impulsively towards the food, and takes it. What is inducement here, and what incentive?

The inducement is made up of (*a*) the food-perception, which is at once reinforced by (*b*) the idea of own movement towards the food-stuff and (*d*) the organic sensations accompanying the pleasant incentive. This incentive is made up of (*c*) the pleasantness of the food-perception *plus* the pleasantness of the movement-idea.

(2) Suppose that the animal perceives, by sight or hearing, the near presence of an *enemy*. It moves impulsively away from the source of danger.

The inducement is made up of (*a*) the enemy-perception, which is at once supplemented by (*b*) the idea of own movement away from the danger and (*d*) the organic sensations accompanying the unpleasant incentive. This unpleasantness is (*c*) that of the danger-perception. *plus* the unpleasantness of the idea of movement (*i.e.*, of the idea of shrinking, giving way, being balked or interrupted).

Formation of the idea of result of movement. § 70. **Impulse: The Idea of Result.** — We spoke just now of 'satisfactory' and 'unsatisfactory' movements. A movement is satisfactory when it leads to a satisfactory *result*, and unsatisfactory when it *ends* unsatisfactorily. No action can be performed without accomplishing or failing to accomplish something; and no result can follow an action without leaving an *idea* of itself in the agent's mind, which may come up again when the next occasion for action arises. So we have a further complication of the impulse-motive: the perception-side of it (the inducement) is enriched by the idea of the result of movement, and the affective side (the incentive) by the pleasure which this idea brings.

Function of this idea.

The presence of an *idea of result* in the motive helps the organism to make its movements precise and accurate, — hastens the work already begun by the idea of own movement. A particular movement-idea is acted out, and a good result follows. The accomplishing of the result directs attention back again to the movement-idea which led to it; and this idea is remembered, becomes a pattern which may be copied later. On the other hand, if a movement-idea is acted out and a bad result follows, attention is directed to that movement-idea, which becomes unpleasant; and the result is that, in future, that particular movement will be shunned. So the idea of result acts as a sort of overseer, weeding out the useless movement-ideas, and planting firmly in the animal's nervous system the physical arrangements for the performance of useful movements, movements that take it straight to the desired goal.

Instances.

Our two instances are now a little more complicated. (1) The inducement to take the food is made up of food-perception, idea of movement and ideas of taste and satiety (the result of taking it); the incentive is made up of the pleasure of food-perception, the pleasure of the idea of movement and the pleasure of the ideas of taste and satiety. (2) The inducement to flee the danger is made up of the object-perception, the idea of movement away and the idea of escape from bodily injury (the result of running); the incentive is the resultant of the unpleasantness of object-perception, idea of injury, and movement-idea, and the pleasantness of idea of escape: it is, therefore, a pleasantness or an unpleasantness, according to circumstances.

Definition of impulse. If, then, one were asked to define impulse, one would say: 'Impulse is a motive to action, made up of three sense-processes (perception of object, idea of own movement, idea of result of movement). This complex, held together by simultaneous association, is given in the state of passive attention, and is therefore accompanied by affection.'

Impulse and emotion. The complete impulse, the impulse with threefold inducement, is still more like an emotion than is the simpler set of movement conditions which we discussed in § 69. Hence we can readily understand Professor Wundt's statement that "every impulse is at the same time emotion," and the corresponding statement of Dr. Lehmann, a Danish psychologist who has made a special study of the affective processes, that "every emotion is at the same time impulse." It is not that emotion and impulse are identical (in that case there would be no reason for the use of the two words), but that each of them overlaps the other. We have just had a parallel instance. At first, as we saw in § 68, attention means action; or, as Professor Sully puts it: "The primitive form of activity is at once, according to the aspect in which we view it, both attention and conscious muscular action." Now, however, it is only attention to a particular set of ideas that means action; so that we have to discuss attention and action in separate Chapters. At first, in the same way, there was no difference between impulse and emotion; "the universal animal impulses are indubitably the earliest forms of emotion." Now the two are so far distinct that we have to treat of them separately; but they still have much in common.

There are two chief differences between the emotion and the impulse. (1) The impulse has about it more *effort* than the emotion. The effort comes from the idea of own movement (*cf.* § 34). And (2) the bodily expression of impulse is a *particular* movement (reaching out the hand, running away); that of emotion is a *diffused* movement, a disturbance of the internal organs and of the whole muscular system.

Degeneration of the impulse:

§ 71. **Psychomotor Action.** — Just as the impulse was bound to arise from the bare, primitive form of action, — just as the inducement to action, that is, was bound to grow from simple object-perception to a mixture of this with the ideas of own movement and of result, — so is it bound to degenerate, to fall back again into simpler forms. And the degeneration is very useful. Suppose that we were obliged to attend to this threefold group of perception and ideas every time that we performed an action, every time that we cut a slice of bread or buttoned our coat! There would be an immense loss of time and energy. And we have now gone far enough into psychology to know that, in the sphere of mind, time and energy are not wasted; wherever a 'short cut' can be taken, it is followed.

loss of idea of own movement;

So the impulse degenerates. In the first place, the idea of own movement drops out of the motive. That idea is valuable so long as the movement is being learned, being modelled after the pattern; it ceases to be valuable when the movement has been learned, and can be performed without thought of the copy. The copy, the movement-idea, then disappears; it no longer means anything to the organism, — and an idea owes its life to meaning something (§ 38). Secondly, the idea of result becomes absorbed, so to speak, in the perception of the object: when we see the knife, we see it as a bread-cutter, and when we take hold of a coat-button, we grasp it as a coat-buttoner. The idea of result comes to be merely a sort of tag, stuck on to the perception. And thirdly, while these two changes are taking place, the perception is becoming indifferent; so far are we from attending to it passively, as we did originally, that we fail to attend to it at all.

reduction of idea of result;

loss of affection.

At this stage we have an action whose conscious condition is a perception, which has a mere tag of idea of result associated to it, and which is not felt (not attended to). Movement occurs directly on the occurrence of the perception. Such action is termed *sensorimotor* or *ideomotor* action.

Sensorimotor or ideomotor action.

Professor James gives the following instance of a sensorimotor action: "I sit at table after dinner and find myself from time to time taking nuts or raisins out of the dish and eating them. My dinner properly is over, and in the heat of the conversation I am hardly aware of what I do; but the perception of the fruit [object] and the fleeting notion that I may eat it [result of movement] seem fatally to bring the act about."

§ 72. **Reflex Movement.** — We have only to carry the development that leads from impulsive to psychomotor action one step farther, and we come to reflex movement. The motive to psychomotor action is a decayed and indifferent impulse. To reflex movement there is no motive at all. The impulse has died out altogether; there is no perception of object, no idea of result, however dim and fleeting. The movement has become, by long habit, ingrained in the

Total disappearance of impulse as motive to action.

make-up of the nervous system; so that when a stimulus is presented, movement follows, without the arousal of any mental process; the ingoing excitation is turned back, reflected outwards, in the form of movement, — the whole series of events taking place quite automatically and unconsciously.

From the impulse to the reflex. A good illustration of the passage from impulsive action to reflex movement is given by the closing of the eyelids, *winking*. You may wink impulsively; perceiving the offensive object, having a distinct idea of the movement, and realising the result to be attained (the freeing of the eye from dust, an insect, etc.). Or you may wink inattentively; vaguely perceiving the insect, and still more vaguely ideating the result of the closure of the eye. This is psychomotor action. Or, lastly, the wink may be a reflex; you may wink without seeing the insect, or thinking at all of the movement or its result, — you may wink, that is, without in the least knowing that the eyelids have moved. As one reads a book, one often winks to cleanse the surface of the eyeball: but there is absolutely no knowledge of the movement.

The involuntary bodily movements. The most reflex reflexes, those that are farthest removed from the impulse, are the internal movements of heart, blood, intestines, etc., that we spoke of in § 67. It is very difficult for us to think of the movement of the blood through the blood-vessels, or of the digestive movements of the alimentary canal, as having once depended upon conscious conditions, upon attention and ideas; and indeed, it would be absurd to think of them in their present form as possibly springing from any motive. But nevertheless they are descendants of the primitive action of § 68; they have been slowly differentiated out of the whole-body movements of early organisms; so that their ancestors, if we may so call them, really had conscious conditions and really did spring from motives.

We said in § 67 that these movements come into psychology only indirectly, as the conditions of sensation or the expressions of affective processes. We must here add to this that they come into psychology *historically*. They are now physiological; but at one period of their history they had psychological conditions.

On reflex movements in general see *H.*, 287, 299; *F.*, 144 ff., 698 ff.

§ 73. **Instinctive Action.** — There are some movements, movements of a complicated sort, which must be made at least once by every member of an animal species in every generation. Caterpillars must spin their cocoon; birds build their nest; flies seek out the fitting place to lay their eggs. These movements, like the reflexes, are touched off mechanically; no motive is necessary. They have sometimes been described as 'compound reflexes.'

Instinctive and reflex movement.

But instinctive movement differs from reflex movement in the fact that the *moving* is pleasant (attended to). The reflex has neither mental antecedents nor mental concomitants; the instinctive movement has well-marked mental concomitants. To quote Professor James again:

"Every step of every instinct shines with its own sufficient light, and seems at the moment the only eternally right and proper thing to do. It is done for its own sake exclusively. What voluptuous thrill may not shake a fly, when she at last discovers the one particular leaf, or carrion, or bit of dung, that out of all the world can stimulate her ovipositor to its discharge? Does not the discharge then seem to her the only fitting thing? And need she care or know anything about the future maggot and its food?"

Explanation of instinctive movement.

The reasons both for the likenesses and for the differences between reflex and instinctive movements are not far to seek. The instinctive movements are being continually repeated, whether by the individual animal or by the species; hence, like the reflexes, they become stereotyped by habit in the nervous system of the species. On the other hand, they are too important to be left entirely without control. The motive, the impulse, has been lost, and with it the controlling ideas of own movement and of result: this loss is inevitable, if the movements are to be stereotyped. The motive is replaced, however, by the mental concomitants, the organic sensations aroused by moving. Their pleasantness keeps the movement going, and holds it in the right channels.

Instinctive action: the instinct as motive.

So far, the development has been downhill: from impulsive action, with its elaborate motive and concomitant sensations, to instinctive movement, which has lost its motive and whose concomitant sensations are therefore made a great deal of. Now the development takes an upward turn. Suppose that an animal that has once performed an instinctive movement (say, nest-building) has to *repeat* it at some future time. Plainly, the second movement will have a motive; there will be an idea of own movement, an idea of result and an idea (if not a perception) of object. Instinctive movement has grown into instinctive action, an action whose conscious conditions differ but very little from those of impulsive action. And the instinct itself, the conscious condition of the action, will become clearer and more definite with every repetition.

Composition of instinct.

If we divide the instinct into inducement and incentive, we get the following list of processes:

Inducement. — Idea of object, idea of own movement, idea of result, idea of organic sensations which will be aroused by moving.

Incentive. — Pleasantness of all these ideas, the pleasantness of the anticipated organic sensations being much the strongest.

Instinct and emotion.

Instinct, like impulse, evidently bears a marked resemblance to emotion. The ideas in it are held together by simultaneous association; the complex is passively attended to; and the organic sensations are prominent in the whole. Hence we find Dr. Lehmann saying: "Every emotion is at the same time instinct"; and Professor James declaring that "every instinct is an impulse," and that "every object that excites an instinct excites an emotion as well." Again, of course, the processes are not identical, but run into and cut across each other in actual experience.

The simplest is not necessarily the earliest form of movement.

§ 74. **The Physiology and the Psychology of Movement.** — When the physiologist sets to work to explain the mechanism of movement, to find out what sort of bodily disturbance is necessary to make a muscle contract, he naturally begins by examining the simplest form of movement, the reflex. Having found the conditions of this, he seeks to account for more complex movements, — sensorimotor and ideomotor action, impulsive action, etc. Working in this way, from the reflex upwards, he is very apt to think that the reflex, the *simplest* form of movement, is therefore the *earliest* form; and that psychomotor and impulsive action have grown out of it, one complication being added after another. Nor have the physiologists stood alone in this opinion. Not a few psychologists, studying movement from the same point of view, have fallen into the same error.

But how do we know that it is an error? Have we not been taking things for granted, in this Chapter, — asserting that the earliest movements have conscious conditions, and that unmotived movements are later growths, rather than proving our assertions?

Yes: and we must, therefore, now that our survey is ended for the time being, pause to set down the arguments which justify our position. They are as follows.

Reflex movement is later than impulsive action.

(1) Reflex and instinctive movements are purposive in character; that is, are adapted to some particular purpose, cut to fit certain circumstances (*H.*, 288). Think of the appropriateness of the winking reflex for the removal of impurities from the surface of the eyeball! Primitive movement, on the contrary, would be vague, indefinite, inappropriate. Hence the reflex must be a late development, not a primitive movement-form.

(2) Many of the reflex movements that express emotion can be understood only on the hypothesis that they are degenerate descendants of impulsive (or even more complicated) actions. Think, *e.g.*, of the jump and wince of § 60.

(3) Impulsive action may be reduced to reflex movement in the course of the individual life. (This fact, of which we have all had experience, will be discussed in § 106). On the other hand, we never find in individual experience that a reflex movement passes into impulsive action.

(4) The results of animal psychology (§ 119) accord well with the theory that the impulse precedes the reflex in mental evolution.

Some investigators (A. Binet, *La vie psychique des micro-organismes*, 1891) declare that the movements of single-celled organisms are all actions; the creatures are *selective*, single out their food from the rest of their surroundings, — evince passive attention. Others (M. Verworn, *Psychophysiol. Protistenstudien*, 1889) think that most of these actions are reflexes, only a few being dimly conscious, rudimentary impulsive actions. We can accept either statement: the single-celled organism is primitive, but has an immense series of ancestors behind it. It may, then, have retained the primitive type of action (Binet), or it may, in certain movements, have taken the downward path towards the reflex (Verworn). It has recently been maintained by A. Bethe (*Pflüger's Archiv*, 1898) that ants and bees are mere automata, — reflex machines. If they are, we cannot but infer from the delicacy and nicety of their movements that they have developed into, not remained stationary at, the reflex stage.

These are the chief reasons for making motived movement the first kind of movement that appeared in the world of life; and the only reason for a contrary opinion seems to be the belief that what is physiologically simplest in the human body (the reflex) must be the earliest type of movement in general. That belief can hardly be adhered to, in face of the opposing arguments.

The physiological difference between motived action and reflex movement is shown, after a greatly simplified fashion, in Fig. 15. In motived action, the excitation travels from the sensory cell *s* (a cell, say, in the retina or the skin) straight up to *c*, the brain-cortex. Here it is worked over, and passes out in the direction of the arrows to *m*, the ending of the nerve-fibre in a muscle. The motive corresponds to the commotion at *c*, the cortical excitation. In reflex movement, the excitation travels from *s* across *r* to *m*; the whole process has been delegated by the cortex to lower nerve-centres; there is no mental antecedent or concomitant of movement.

The cortical arc *scm* represents an arrangement that is older, in the history of the race, than the short cut, the reflex arc *srm*.

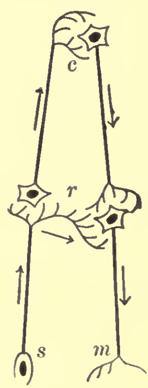

FIG. 15

§ 75. **The Classification of Impulses and Instincts.** — The attempts to classify human impulses and instincts have met with even less success than the attempts to classify emotions. There is oftentimes no clear line of division, in actual experience, between impulsive, psychomotor and instinctive action. And the kinship of instinct, impulse and emotion is so close that one and the same process may be interpreted as any of the three, according to the point of view of the psychologist who is writing about it. It is

Classification of impulses and instincts is neither possible no wonder, then, that one author says: "Instinctive acts in man are few in number," and another: "No other mammal, not even the monkey, shows so large a list." Everything depends on the point of view, and on the use of terms to which the point of view leads.

Let us take some illustrations. Fear is an emotion; yet there are instinctive fears (fear of the dark, of strange things and people, etc.). Almost all the names for objective emotions — like, dislike, sympathy, antipathy, attraction, repulsion — are also used to denote fundamental impulses. Who can say precisely at what time bread-cutting and coat-buttoning passed from the impulsive to the sensorimotor stage? Or take this case: I am out for a walk with a friend; see something glittering by the roadside, — a pin, it may be; stoop, and pick it up. Is this sensorimotor action, or the outcropping of the acquisitive instinct?

nor important.

Fortunately, the enumeration of impulses and instincts is not a very important matter. The key to the psychology of action lies not in the making out of a complete list of motives, but in the right understanding of the composition of motives, and more especially of the impulse. Impulse is the cardinal process in the action-consciousness. If the reader has a thorough grasp of the principles upon which it is formed, and can trace the development of the three degenerate forms from it, he will easily steer his way through the conflicting statements of the different psychologies. And — what is more important — the shiftings and changings that the processes undergo in practical experience will cease to be puzzling. Here, as everywhere, a sound theory simplifies the facts.

§ 76. **The Simple Reaction.** — The psychology of action can be investigated in the laboratory: indeed, 'reaction experiments,' as they are called, are in many ways of great psychological importance. They are performed as follows.

Reaction-time. It is agreed between the experimenter and the 'reactor' that at a signal given by the former a definite movement shall be made by the latter. To get action at its lowest terms, *i.e.*, to keep all the conditions of the experiment as simple as possible, the signal chosen is of such a kind as to arouse a single sensation (of noise, light, etc.), and the movement is that, *e.g.*, of a single finger. The instruments used are so constructed that the time elapsing between the signal and the movement can be measured: it is called the 'reaction-time.'

Direction of attention in the reaction experiment. We saw in § 15 that attention to the matter in hand is essential to successful introspection. If, then, the reaction experiment is to give us introspective knowledge about action, the reactor must be attentive. But here a difficulty arises. What shall he attend to? Shall he attend predominantly to the signal (the stimulus), or to the movement, or shall he try to attend to both at once, to grasp the whole experiment? Each of the three directions of attention is possible; and to each of them there corresponds a special form of reaction.

Sensorial. (1) *Attention on the Stimulus: the 'Sensorial' Reaction.* — The reactor enters upon the experiment with two ideas in mind: the idea of the result of his action (getting the experiment over, or learning something about the psychology of action, or doing something that comes in the day's work) and the idea of the stimulus. The stimulus is given; the idea of it is replaced by its perception (perception of object); the two processes are at once supplemented by the idea of own movement: movement follows.

This, the 'sensorial' reaction, is plainly an artificial impulsive action. Moreover, it cannot degenerate to any appreciable extent. In course of practice, the idea of result and the idea of own movement are much reduced, tending to become mere tags attached to the perception of object. But this complex must, by the terms of the experiment, be attended to; the action can never pass over into the sensorimotor form.

The average duration of the sensorial reaction is .270 sec., when the stimulus is a flash of light; .225 sec., when it is a noise; and .210 sec., when it is a sharp pressure. The differences are due, physiologically, to differences (1) in the mode of excitation of the peripheral organs, and (2) in the readiness of associative connection between these organs and the reacting member.

muscular

(2) *Attention on the Movement; 'Muscular' Reaction.*— The reactor has two ideas in mind: the idea of the result of his action and the idea of own movement. The stimulus is given; the perception of object associates to these two ideas: movement follows.

This, the 'muscular' reaction, seems also, at first sight, to be an artificial impulsive action. There is a difference, however. Attention to the coming movement means bodily preparation for the making of that movement; the hand tingles to move. For the time being, there is a sort of reflex connection between the sense-organ to which the stimulus will appeal and the reacting finger. Hence the action is not impulsive; it approaches the reflex type. On the other hand, it is not a reflex or a sensorimotor action, because attention to the movement-idea is presupposed.

The average duration of the muscular reaction is .180 sec. to light, .120 sec. to sound, and .110 sec. to sharp pressure.

and central reactions.

(3) *Attention Diffused: the 'Central' Reaction.*—The reactor has three ideas in mind: those of result, of own

movement and of object. The giving of the signal changes the idea of object into its perception: movement follows.

This, the 'central' reaction, evidently stands, for psychology, midway between the other two. And its duration lies midway between their durations.

Psychological importance of the reaction experiment.

The three forms of reaction are all important. The sensorial form, an unchanging impulsive action, allows the reactor to examine the impulse introspectively, under standard conditions. It also serves as the point of departure for the investigation of motives to action that are more complex than the impulse (see Ch. XIII.). The muscular form, taken alternately with the sensorial, gives practice in the control of attention: the experimenter, noting the duration of the reactions, can tell whether the reactor is able to shift from the idea of signal to the idea of movement, and *vice versa*, or whether in each experiment he vacillates between the two: *i.e.*, can determine how much practice is needed for the attention to travel from the active to the secondarily passive stage. Again: if the attention is permitted to lapse from the movement-idea, the reaction comes to be very like a true reflex movement; so that the passage from impulse to reflex can be traced by the experimenter. The central form is interesting as the normal, obvious form of reaction; the reactor, if left to himself, reacts as a rule with diffused attention. Moreover, if the diffused attention is permitted to lapse, the central reaction passes over into an artificial sensorimotor action; so that the passage can be traced to this from the impulse,— and traced under more natural conditions than would be the case if attention were permitted to lapse from the object-perception of the sensorial form.

The association reaction.

The sensorial reaction has been employed in the study of successive association, of the putting together of the train of ideas (§ 56). The reactor is told that he is to move his finger, not when he has perceived the signal, but when some idea (or series of two or more ideas) has followed that perception by way of successive association. The experimenter, knowing the associated ideas, and knowing the length of time that each association took, obtains an insight into the reactor's mental constitution: sees whether his mind is addicted to abstract thoughts, or moves most easily among concrete things; whether it is a mind that generalises, rises to more general ideas than that conveyed by the stimulus, or a mind that particularises, descends from the given perception to ideas that come under it as instances, etc., etc.

Reaction and memory-type.

The central reaction, again, has been employed in the study of memory-type (§ 50), on the theory that its duration will approach that of the sensorial or muscular form, according as the reactor belongs to one type or another. When he reacts to light, *e.g.*, his reaction-time will approach the sensorial, it is said, if his ideas are visual, and the muscular, if they are tactual. So far, however, the results obtained on this theory are of doubtful significance.

Questions and Exercises

1. *The Reaction Experiment.* — The instrument represented in Fig. 16 is Professor Sanford's reaction-timer. It is constructed as follows.

Two brass pendulum-bobs, *a* and *a'*, are suspended by inelastic threads from the bar, *b*. The threads (the one of which is red, and the other white) are knotted through two holes bored in the bar, pass through similar borings in the bobs, and are held fast by the two set-screws, *c* and *c'*. They are prevented from spreading by being laid in four grooves cut in the upper right-hand surface of the bar. The pendulums can be lengthened and shortened at pleasure, by clamping the set-screws at different parts of the threads. — On the right of the cast-iron base, *d*, are placed two keys, *e* and *e'*. The lips of the keys, on the side towards the bobs, close so far as to grip tightly the shaft of a light brass-wire hook. One of these hooks, *f*, lies in the Figure upon the base of the instrument. Counter-hooks are fastened to the pendulum-bobs. Pressure upon the buttons of the keys uncloses the lips, so that the brass hooks are released. — It will be noticed that the keys stand at different levels upon the base, and that the pendulums are of correspondingly different lengths.

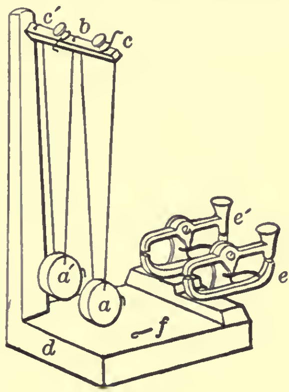

FIG. 16

The instrument is tested in this way. See that the bobs hang evenly in the middle of their threads. Place the hooks between the lips of the keys, and hook the bobs into them by the counter-hooks. Now (1) release the nearer, longer pendulum by pressing the button of the lower key. Count the swings of the pendulum (beginning from zero, not from 'one') by help of a stop-watch. Note how many full, *i.e.*, back-and-forth swings occur in 1 min. Divide the time by the number of swings, and you have the duration of one total swing. We will suppose that this is 0.8 sec.; that the pendulum returns to the position from which it started in 0.8 sec. (2) Release the farther, shorter pendulum, by pressing the button of the upper key. Take the time of swing in the same way. We will suppose that it is 0.78 sec. It is clear now that the long pendulum makes 39 full swings while the short one makes 40; that the shorter gains a full swing on the longer in every 40 of its swings. The unit of the instrument is, therefore, 0.8 sec. ÷ 40, or one-fiftieth of a second. That is to say: the long pendulum loses, the short gains, 0.02 sec. in every full swing. (3) Test this result by letting the two pendulums swing together, and counting the number of swings of the long pendulum that elapse between coincidence and coincidence of the four threads, *i.e.*, between the times of their lying in one and the same plane. If your previous counting was correct, the coincidences should come at the 39th, 78th, 117th, etc., swings.

(1) We are now in a position to take a reaction-time. Let it be the time of reaction to a *sound* stimulus. The base of the instrument is clamped firmly to the table. The pendulums are hooked to the keys, and the hooks adjusted till the four threads lie in the same plane. The experimenter places himself squarely before the apparatus, so that he can accurately gauge the position of the threads. The subject sits with closed eyes, the forefinger of the right hand laid lightly upon the button of the higher key. The experimenter says "Now!" and, after an interval of 1.5 – 2 sec., raps sharply upon the button of the lower key, thus releasing the long pendulum. On hearing the sound, the subject presses the button of his key, and releases the short pendulum. The experimenter counts the swings of the long pendulum, from the time of its starting to the time of the first coincidence of the four threads. If the two pendulums are together at the sixth swing, the reaction-time is 6×0.02 sec., or 0.12 sec. (muscular reaction); if they are together at the eleventh, the time is 0.22 sec. (sensorial reaction). It may sometimes happen that the two pendulums seem to be in exact coincidence during two swings, say, the tenth and the eleventh: in that event the time must be counted as 10.5×0.02 sec., or 0.21 sec. But this will not happen after the experimenter has had a little practice in observation of the threads.

(2) If the reaction is reaction to *pressure* stimulus, let the subject lay the forefinger of his right hand upon the upper, and the forefinger of his left hand upon the lower key. The experimenter then presses upon the latter finger (stimulus is given), and the subject reacts by pressing down his own right-hand finger, as before.

(3) If the reaction is to *sight*, the subject keeps his eyes open, and presses the button of the upper key when he sees the experimenter's finger move in the act of pressing that of the lower. Or the experiment may be made by help of the 'side wire,' furnished with the instrument, as follows.

A piece of stout wire, bent to the shape shown in Fig. 17 *a*, is attached to the upper part of the key, *e* just above the large screw which forms the axis of the key. When the lips of the key are closed, the upper end of the wire inclines inwards, toward the pendulums. When the button is pressed, the wire moves to a vertical position. The wire is slit at its upper end, to take a small disc of white cardboard. Between the keys, *e* and *e'*, must be set up a screen of black card, having a circular opening which allows the white cardboard to be seen when the wire stands vertically, but not when the lips of the key are closed. The opening should be somewhat smaller than the white disc. — The subject fixes his eyes upon this opening, before the experiment begins, and reacts when he sees the white card appear behind it. This happens, as we said, when the experimenter presses the button of *e*. To avoid the click produced by the striking of the button of the key upon the platform below, it is well to pad the latter with cotton-wool, and to encase the metal parts and the pad with a piece of rubber tubing (Fig. 17 *b*).

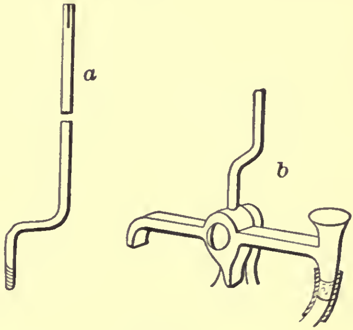

FIG. 17

(4) In the *association* reaction (sound stimulus), the experimenter calls out the stimulus word as he opens the lower key. Suppose that a 'whole' is to be called, and some 'part' to be associated to it by the subject. The experimenter calls out "Fish!" — pressing the button of the lower key at the moment he utters the word; the subject presses his key when he has thought of 'fin' or 'tail.' In such cases it may happen that the long pendulum makes a full swing before the short one starts. This must be noted by the experimenter, and the 0.8 sec. added on to the time (taken in 0.02 sec. units) during which the two pendulums are swinging together. — In visual experiments, printed words replace the white disc held by the side wire. The reaction-movement is made after association to the word stimulus.

The following points may be noticed:

(*a*) The subject should write out an introspective account of each experiment, stating whether or not he has obeyed orders as regards direction of the attention, whether or not his reaction was disturbed by chance noises, etc., etc.

(*b*) Not more than 15 or 20 experiments should be made at a single sitting. Otherwise the subject becomes fatigued.

(*c*) Practice is not complete until the average difference between the separate reaction-times and the average time of the series has fallen as low as one-tenth of the average time. Thus the series .255, .275, .290, .265, .300, is a good visual sensorial series. The average time is .277, and the average difference between this and the separate times .014, — not much more than one-twentieth of .277. On the other hand, the series .200, .330, .210, .265, .380, is worthless. The average is again .277; but the average difference between this and the separate times is .062, — an amount that lies between one-fourth and one-fifth of .277. Practice is here incomplete.

2. Define instinctive action.

3. On p. 171 an instance of *sensorimotor* action is given. Suppose that you have intended to do something, but have forgotten about it; that later in the day the idea of what you had meant to do recurs to you; and that you jump up at once to do it. This would be an instance of *ideomotor* action; object-perception has been replaced by object-idea. — Give instances of both forms of psychomotor action from your own experience.

4. Make a Table, in the form of a genealogical tree, of the various kinds of action discussed in this Chapter. Give an exact account of the composition of the motive in every case.

5. Name some of the principal reflexes.

6. Rudimentary organisms do not possess a 'brain' with a 'cortex.' How do you reconcile this fact with the statements made above in regard to Fig. 15?

References

James, *Textbook*, chs. xxiii., xxv.; pp. 415–428, 120–124, 126–128.
Sully, *Human Mind*, vol. ii., ch. xvii.
Titchener, *Outline*, §§ 61–67, 92, 93, 98.
Wundt, *Lectures*, Lects. XV., XVIII., XXVI., XXVII., XXVIII.
Wundt, *Outlines*, § 14.

CHAPTER X

Memory and Imagination

§ 77. **The Two Kinds of Memory and Imagination.** — The reader will remember that we drew a distinction, in Chapter V., between passive and active attention. In passive attention, some one idea dominates consciousness with an unquestioned authority; in active attention, there is a struggle of several ideas for the supremacy (§§ 31, 32).

Some complexes are formed in the state of passive, others in that of active attention.

All the complex processes that we have examined so far — the assimilation, the train of ideas, the emotion, the impulsive action — are processes that take shape in the state of passive attention. There are other, and very important processes, which can take shape only in the state of active attention. Thought and creative imagination, the sentiment of beauty or of truth, deliberate and purposed action, — these are wholly foreign to a mind that has not risen above the level of primary passive attention; they are the crown and flower of mental evolution. It is natural, then, that we devote our final Chapters to their consideration.

Our business with the passive side of mind, however, is not quite over. There are certain processes, composed chiefly of perceptions and ideas, and occurring in passive as well as in active form, that we have not yet touched upon: the processes which are grouped under the headings of memory and imagina-

'Memory' and 'imagination' may be either active or passive.

tion. We could not treat of passive memory and passive imagination in Chapter VII., although both of them are put together by way of simultaneous association, because both are made up in part of a peculiar *mood*, and moods could not be discussed until we reached Chapter VIII. Comprehension of the laws of mental connection would be a much easier matter than it is if one could take in three chapters — sensation, affection, attention; or association, emotion, impulsive action — at a single reading.

In the present Chapter, then, we shall describe both the passive and the active forms of memory and imagination.

§ 78. **Recognition and Memory: Passive.** — Most of our perceptions and ideas are familiar to us. We have seen that they are mental short cuts to knowledge of the outside world (§§ 41, 50), — symbols rather than copies of things, tags of meaning rather than the complex processes that they were in the minds of our remote ancestors; we have seen, *i.e.*, that they are familiar in the objective sense, in the sense that they have long been employed and are easily handled. But they are also familiar in the subjective sense; we *realise*, when they enter a consciousness, that they are familiar; they have upon them a mark or sign which, as it were, says to us: "This is your old friend, the perception that you had *then*, or the idea that you gained at such and such a time."

Passive recognition and memory. When a perception or group of perceptions has this mark of familiarity upon it, we speak of *recog-*

nising someone or something. When it is an idea or group of ideas that bears the mark, we speak of *remembering* someone or something. "I've been here before!" "I'm sure I know that face!" "Why, who'd have thought of seeing *you?*" — these phrases are all expressions of recognition; the perception is familiar. "Oh yes! he came here the year the so-and-so's were married;" "It was in 1870, in October, — I read about it at the same time that news came of the capitulation of Metz;" "No! it's the male bird that has the yellow; the female is white" — these are expressions of memory; the idea is familiar.

The mark of familiarity. The first thing that we have to do, then, in investigating passive recognition and memory, is to find out what precisely the 'familiarity mark' is; of what processes it consists, and how it becomes attached to perceptions and ideas.

No idea is intrinsically a memory-idea. What we said in § 50 about memory-types may have led the reader to think that some, if not all ideas are intrinsically memory-ideas; that when we have an idea, we *ipso facto* have a memory. This is not the case. No idea is a memory in its own right; it must have the memory label affixed to it. We speak of 'memory-types' rather than of 'idea-types' simply because memory is the use, so to say, for which ideas are intended; it is in being remembered that ideas get their practical value. But the phrase 'idea-types' would be really more correct: since a 'memory' is a marked idea, a mind whose ideas are of a certain type naturally 'remembers' in ideas of that type.

Familiarity means § 79. **The Mark of Familiarity.** — When you recognise a figure in the street, two things happen. In the first place, the perception is supplemented by a association number of ideas: perhaps the name of the person comes up, perhaps the circumstances under which you last saw him, perhaps some business that you have or have had with him, perhaps a question that you wish to ask or a story that you have heard about him. There is no before and after in the experience; as soon as you see your acquaintance, these ideas are present in consciousness: it is a case of simultaneous association. True, the simultaneous association may form the starting-point for a successive association, for a train of ideas; but in the recognition itself the association is simultaneous. In the second place, you are thrown into an agreeable mood, the mood of ease or confidence, of 'at-homeness'; you feel familiarly towards the figure. On the other hand, the passers-by whom you do not know, do not recognise, are perceived merely; they have no power, as personalities, to awaken associated ideas in your mind: and you feel indifferently towards them; they do not affect or 'concern' you. Of course, a 'striking' face or costume may compel the passive attention (§ 31); but such perception is not recognition.

and the mood of confidence.

The same thing holds of memory. When you remember something, whether it is a scene of your childhood or the date of Julius Cæsar's assassination, the idea of that something is supplemented at once by a crowd of other ideas; and, as these ideas cluster round it, the at-home feeling comes too.

These two groups of processes, then, — the associated ideas and the mood of confidence, — together make up the mark of familiarity. They attach to a perception, in every case of recognition; they attach to an idea, in every instance of memory.

There are three points to notice, in regard to the familiarity mark. (1) The mood of at-homeness or confidence is a weakened form of the emotion of relief. Fear of strange things and strange people is instinctive with man (§ 75); and it is a survival of fear unfulfilled, of relief, that we experience when we recognise. (2) The mood is, however, a very degenerate form of this emotion. The 'body' of every complete emotion is a vivid and complex feeling (§ 59). In the mood of at-homeness there is no trace at all of this central feeling, no attention to a 'situation'; the current train of ideas is not interrupted; the mood consists solely of a pleasant affection and of the organic sensations set up by an easy and careless bodily attitude. (3) It follows from (1) that every recognition is inherently pleasant. Oftentimes, it is true, the pleasantness of the at-home mood is outweighed by the unpleasantness of the associated ideas: we may recognise a person whom we particularly want to avoid. But this does not impair the previous statement: in itself, recognition is pleasurable.

Recognition means relief (but a greatly weakened form of relief) and is inherently pleasurable.

It is exceedingly important to understand the psychology of recognition, for the reason that recognition brings out, perhaps even more clearly than perception (§ 38), the part that *meaning* plays in the shaping of mind. A perception is a group of sensations, and yet is not accurately described when these sensations are accurately described. For it is formed under stress of biological necessity, — at the bidding of external nature; it must *mean* some natural object, if it is to hold together; and, unless we state this, its description is incomplete. Recognition illustrates the same fact from a different point of view: it shows us that, when a complex process holds together, it has a meaning.

Psychological 'meaning.'

For consider. We say that certain associated ideas and a certain mood make a 'perception' a 'recog nised perception.' "Very well," you may reply: "but how do we recognise the ideas and the mood? They cannot help us to recognise anything, unless they are themselves recognised." The answer to the objection is this. The grouping of associated ideas and mood round a perception *means* that that perception has occurred in our experience on some previous occasion. But the 'recognition' of a perception means this, too. 'Recognition,' then, simply sums up in a single word 'grouping of associated ideas and presence of mood.' These processes do not themselves need recognition: they *are* recognition. They would fall apart, unless they meant something; and their meaning — a meaning implanted in them by external nature — is: "You are safe: this thing has been here before."

Recognitions and memories differ in definiteness.

§ 80. **The Degrees of Recognition and of Memory.** — We have now answered our first question; we know what the 'mark of familiarity' is. But while all recognitions and memories are alike in general outline, so to speak, — all being instances of simultaneous association, all containing the same mood, and all having the same practical meaning, — they differ very greatly in *definiteness*. We said in the last Section, that the perception (in recognition) or the idea (in memory) is supplemented by 'a number,' 'a crowd' of other ideas. This is true in cases of complete or definite recognition and memory; it is not true in all cases. We find every degree of definiteness, from a vague and shadowy acquaintance, with perhaps a single associated idea, to clear and perfect knowledge, with a whole consciousness-full of associates.

Suppose that a number of different people are shown a photograph of the same painting. They would all recognise it as a photograph, and probably, if they looked at all closely at it, as taken from a painting. But beyond this point their recognitions might show all degrees of definiteness. One might say: "I don't know it: it is evidently a sacred picture, but that's all I can say." Another: "It must be a Raphael; but I don't know which." Another: "It's one of the famous Raphael Madonnas; it seems familiar to me, and I'm sure I've seen an account of it somewhere, but I can't remember now where it was." Another: "Oh yes! It's the Sistine Madonna, — Raphael's." Another: "Of course: that's the Sistine, — stands in the little room in the Dresden gallery, where the Holbeins are." Another will know this, and will be able to give in addition the complete colour-scheme of the picture; and another will be acquainted with its history, — and so on. Here we have various stages of recognition, rising from great indefiniteness to great definiteness. The principle is the same throughout. **Instances.**

So with memory. Ask a number of people who read the same book at about the same time what they remember of it. Some will have "forgotten the plot: but it was a good story." Others will tell you, in a sketchy way, what were the chief incidents in the tale. Others will recall it in greater detail, and will give you certain scenes quite vividly. Others, again, will remember 'all about' the book: what the story is, and why it was written, and what effect it had on the public, and what the author's life-history was, and so on.

The less definite the associates, the less strong is the mood of confidence. But *some* associate — if it is only the bare thought "I know!" — and *some* trace of the mood are present in our dimmest memories and blankest recognitions.

§ 81. **Recognition and Memory: Active.** — The processes of remembering and recognising are always the same, and always occur in the state of passive attention. But they may be *preceded* by a state of active attention; we may not recognise a thing till after we have actively attended to a number of perceptions, — and we may not recollect a name till after we have actively attended to a long series of ideas. In other words, the state of passive attention in which they occur may be that of secondary passive attention. Cases of this kind show us recognition and memory in their 'active' forms.

What is meant by 'active' recognition and memory.

Instances.

Suppose that you are trying to find your way along a little-used forest path, which you have travelled only once or twice before. You come to a doubtful place: the tree looks right, but you are not quite sure: there ought to be a big stone a few yards on, and then a swampy patch. If the stone and the bit of marsh show themselves, you 'recognise' the path: active lapses into passive attention. If they do not, you go back to the tree, and scrutinise the ground again. On a familiar path, the associates and the mood of confidence are present from the beginning. — Recognition is made up of just the same processes in both cases; but in the first case it is preceded by active attention.

Or suppose that you are trying to think of the name of someone whose face is familiar to you. You "know his name as well as you know your own"; but the word obstinately refuses to come. You now attend actively to a number of ideas, some one of which you hope may be strongly enough associated to the required name to bring it up: you think of the scenes in which you have met the possessor of the name, of his usual occupations, of his friends' names, — you run through the alphabet, recalling the names that begin with the different letters, and so on. At last you get the name, or get some idea that brings the name with it: the name is supplemented by all sorts of ideas (instances of its use, times and places), and the mood of confidence arises with a touch of real relief in its composition. — Again, the memory is precisely like passive memory, except that a stage of active attention has preceded it.

The term 'memory' is sometimes employed in a narrow sense to mean 'passive memory,' and active memory is expressed by the word 'recollection.'

§ 82. **The Physiology of Memory and Forgetfulness.** — Since all our memories are formed by way of simultaneous association, the law of memory will be the same as the law of association: *all* the connections set up in a consciousness tend to persist (§ 54). Fortunately, however, in memory as in association, only part of these connections do persist in actual fact. In association, it will be remembered, some one sensation in the complex perception or idea suggests another perception or idea; it is not the whole idea that calls up another, but only some particular side or aspect of it (§ 57). If every sensation in every idea were equally ready to call up associates, consciousness would be a mazy tangle of processes, and definite meaning would be impossible.

Forgetfulness a condition of the usefulness of memory.

So it is with memory. If we are to remember usefully, we must forget a great deal. If we remembered every incident of every day, — at what time we got up, what letters we received, what we had to eat and drink, what exercise we took, what work we did, — we should be lost in the wealth of our own ideas; we 'should not see the wood for the trees.'

The law of habit.

The course of association can be explained, as we saw, by the law of habit: the more habitual the co-excitation in the brain, the more certain the association in consciousness. Remembering and forgetting may be explained in precisely the same way.

Habitual associates are remembered; accidental associates, forgotten.

The different levels of habit.

The deepest-seated habits of the brain are its natural and acquired tendencies (§ 57). Hence we remember what fits in with our mental constitution, and forget what does not. Then there are the habits set up by a sudden wrench. We remember vivid, strong, unexpected experiences, and forget the rest. Thirdly, there are the social and professional habits of adult life. We remember the details of our business or of our science, so that the outsider is often surprised at the richness of a technical memory, — not thinking how poor that memory is for other things. Lastly, there are the temporary habits set up by recent events. We remember recent occurrences, for a little time, just because they are recent; every dint in the brain, so to say, remains for a while, till it is obliterated by the multitude of still newer impressions.

Habit means past attention.

Putting all this together with what we said in § 57, we cannot resist the conclusion that *where habit is, there attention has been.* Just as reflex movement arises by way of attentive (impulsive) action, so is the machinery of memory and association set up by way of foregone attention. An idea that fits in with our mental constitution is an idea that we attend to; a vivid, strong, unexpected idea is also attended to; the details of our profession are the things that interest us. Though we remember for a few hours the time that we got up in the morning, the time-idea is doomed to forgetfulness when the first flush of newness is past, simply because we did not attend to it. Let us get up unusually early, and we remember the fact for weeks. — This is how it comes about that the idea attended to is more valuable, more suggestive than other ideas (§ 30). The ideas that come to mind in the most fanciful day-dream, in the mechanical and inattentive flow of consciousness, would not come unless they had, at some time, been attended to.

Cramming.

Notice the light that this Section throws on the subject of *cramming*. The student who crams for an examination trusts to recency of experience to carry him through; he hopes that a certain amount of his reading will cling to him for just the day or two that he needs it. Hence cramming is bad, if you want to remember, good, if you want to forget, what you have learned. Professor James emphasises the bad side. "Things learned thus in a few hours, on one occasion, for one purpose," he says, "cannot possibly have formed many associations with other things in the mind. Speedy oblivion is the almost inevitable fate of all that is committed to memory in this simple way." The late Professor Jevons, one of the best known of English logicians, looked at the matter from the other point of view. It is, he says, "a popular but wholly erroneous notion that what boys learn at school and college should be useful knowledge indelibly impressed upon the mind, so as to stay there all their lives." Cramming "is the rapid acquisition of a series of facts, the vigorous getting up of a case, in order to exhibit well-trained powers of comprehension." And this, he insists, is a fitting for the business of later life.

§ 83. **The 'Three Stages' in Remembering.** — Psychologists often speak of 'the three stages' or the 'triple process' of memory. The three stages are those of retention, reproduction and recognition. We have a perception: it is *retained* in the mind, as an idea; the mind *reproduces* it, brings it out again for use, when occasion arises; then, when it is brought out, it is *recognised* as the old perception.

The reader will see that these three terms furnish a description of memory which corresponds, roughly, to the facts. Yet it is a description which differs very considerably from the account of memory given in § 78. The difference illustrates the difference between scientific psychology and the popular psychology that we spoke of in § 3. Let us consider the terms in order.

(1) It is misleading to say that the mind *retains* **Retention.**

ideas. If the mind were a creature inside of us, it might do this, and we know nothing about the fact. But if our ideas and feelings and so on *are* the mind, an idea which is not now present in consciousness is not an idea at all. No! it is not the mind that is retentive, but the brain-cortex; and even it is retentive only in the sense that it acquires habits of functioning. The commotion that the perception sets up in the cortex is not bottled away, and kept ready for use; it persists simply in the form of a tendency of the cortex to fall into the same state of commotion later on.

Reproduction. (2) If the mind stored up its ideas, keeping them out of sight till wanted, it would be true to say that they are reproductions of the original perceptions. They would be, in fact, renewed or revived perceptions. But we saw in § 50 that, while primitive ideas are really weaker copies of perceptions, our own ideas (as a general rule) are not; the original commotion has been translated, by the tendencies of the nervous system, into the language of that particular system: so that our memory of a sound (a musical air) may be a sight (printed words), etc. There need be no scrap or atom of the perception in the idea that means that perception to us.

Recognition. (3) Nor does the mind stand apart from the revived perception, look at it, and then go through a peculiar performance, the act of recognition. Whenever consciousness is made up of a central idea, of associates to that idea, and of the mood of confidence, memory is going on.

All these words — retention, reproduction, recognition, recollection, memory, etc. — have come down to us from a psychology which did conceive of the mind as a living creature of some kind, residing in the body. They were the names given to powers or faculties or capacities of this creature. It laid up its perceptions, as the careful husbandman lays up a stock of grain; it brought them out, in time of need, as he brings out his store of wheat; it gathered up again any that it had let slip, as he gathers up (re-collects) the seeds scattered on the granary floor; etc., etc. We have outgrown these views. But words which have been used as long as these cannot be simply thrown away, and replaced by new terms; they have become a part of the science. We must take them; but we must also reinterpret them. In modern psychology, a memory is an idea accompanied by associated ideas and the mood of at-homeness. Memory in the abstract — tenacious memory, logical memory, poor memory — is one phase or feature of mental constitution.

The old and the new psychology.

§ 84. **Direct Apprehension.** — Some perceptions and ideas become so familiar, by constant repetition, that we do not recognise or remember them, but simply take them for granted. We are then said to 'cognise' them, or to have a 'direct apprehension' of them.

Recognition, memory, and direct apprehension.

Think of the first watch that you possessed. For a while you 'recognised' it every time that you pulled it out of your pocket; the sight of it called up a flood of ideas — who gave it you, what a good one it is, which of your friends have one and which have not, etc. — and a strong mood of relief: you 'made sure' that you had it, and were not dreaming. The relief alternated, perhaps, with satisfaction, hope fulfilled. Very soon, however, the satisfaction passed over into equableness, and the recognition into direct apprehension. You took the watch for granted; of course you had one.

So for the first few times that you apply an algebraical rule, you 'remember' the rule. It comes up in mind with many associates, and you set about your work with relief and confidence. But as you go on, solving more and more problems by its aid, you apprehend it directly: of course you use it, — it is the rule to use.

What 'taking things for granted' means.

In direct apprehension, all the associated ideas that help us to recognise and remember have fallen away. The perception or idea is *so* familiar that they would now be useless or worse than useless, encumbrances rather than aids. And the mood of confidence, though it has not wholly disappeared, is greatly weakened. It persists dimly, as a sort of fringe or halo, telling us that the perception or idea is a matter of course. The 'at-homeness' has degenerated into an 'of-courseness' which tinges all the very familiar things of life: our friends' faces, the furniture of our rooms, our own tricks of expression, the round of ideas that carries us through our day's work, and so forth.

The of-course mood.

This of-courseness is a real mood, a pleasurable state, and not a state of indifference. Its psychological nature is best brought out by contrast. Just as we do not realise the blessings of health till we have passed through a time of ill-health, so we do not know how really necessary to our comfort the existing order of things is until it has been disturbed. Think of the misery of the weekly 'turn out' of your special room! You come home after the morning's work, and find everything looking strangely and uncomfortably new; books and papers are neatly arranged, chairs symmetrically placed, and an unhomely dampness is over all. Gradually things begin to take on their accustomed aspect; you pass from relief to at-homeness, and from that to the of-course mood of direct apprehension.

§ 85. **Mental Imagery.** — To 'image' a thing means, in psychology, to ideate it in kind: a tree is imaged by a visual idea, a piano note by an idea of hearing, running to catch a train by a tactual idea: the ideas are the same in kind as the perceptions which they represent. In this sense, a mind is more or less 'imaginative' according as it is better or worse constituted to think of things in kind: and the primitive mind — the mind whose ideas are photographic copies of perceptions (§ 50) — is the most imaginative of all. Mental images

But *visual* images are to images in general very much what words are to ideas (§ 17). That is to say, if a man thinks at all in ideas of kind, it is probable that those ideas are mainly visual, that the sound and touch parts of his perceptions are translated by the nervous system into visual terms. Hence when we say that so-and-so is 'imaginative,' we mean as a general rule that he can picture things and events distinctly in his mind's eye. A man may have the most vivid tactual 'pictures,' lifelike tactual images, — but still, if he lacks visual imagination, he will be classed by most of his friends as unimaginative. are, more especially, visual images.

In strictness, then, the memory-types of Ch. VII. might equally well be termed 'imagination types' (*cf.* § 77). We keep the word imagination, in the sense of visualisation, partly because it has come down to us in that sense from the older psychology and is current in the same sense in popular thinking; but partly, too, because it is useful to distinguish the 'imaginative' mind from minds of unimagi- The danger of imagination.

native constitution. We are apt to think of imaginative people as unreliable people, people who cannot describe an incident without embellishing it. And indeed, this tendency to depart from facts is the besetting danger of the imaginative mind. For suppose that, as you tell a story, every word that you utter is supplemented at once by some picture. The picture comes up by association; and, since the verbal idea has a whole host of associates, there will almost certainly be elements in the picture that were not in the original experience. You naturally describe these, as well as the true features of the picture. And the process is repeated, till the facts are buried under a mass of fictitious details.

Children's lies.

A large proportion of the lies told by young children are of this character. They are not due to any moral defect; it is simply that imagination colours the story in the telling. And as all imagination has upon it the of-course mark (the very fact that we imagine shows that image-ideas are those most familiar to us), the children are unable to distinguish between fact and fancy. They must be taught the distinction, in the course of education, if what begins as a normal feature of mental constitution is not to end as a habit of exaggeration and disregard of truth. Rightly schooled, imagination is of the greatest service in after life (see above, § 51).

Two ways of imaging.

There are two different ways of imaging. Some people see the visual images as if they were out in space, — at about the same distance from the body that the objects would be which they represent. Others do not localise them at all: they are extended (p. 100), but not referred to any particular distance from the body. It seems to be the rule that images of this latter sort are deeper in colour and more transparent, so to speak, than the others; those of the former kind are more definite in outline, but harder and cruder in colour (*cf.* the effect of background, p. 97).

§ 86. **Passive Imagination.** — In passive imagination, the imaging goes on in the state of primary passive attention. It is best illustrated by the reading of fiction. The words of a warm, living story are the exact translations of imagined, pictured scenes; and if the reader is to reconstruct the pictures thus transcribed, he must himself be not destitute of imagination. The writer, having elaborated his plot, photographs it in words; the imaginative reader absorbed in the words, reimagines the writer's images. **Passive imagination.**

Another instance of the same kind is afforded by the illustrations to novels. If they are good, the reader's imagination is assisted, guided, encouraged; if they are poor, it is choked. Cruikshank's and Seymour's and Browne's illustrations of Dickens are of the former kind: the pictures of Fagin and Mr. Pickwick and Ralph Nickleby help us to imagine the men. Oftentimes, however, a picture shows a lack of imagination on the artist's part. In that case, the reader's imagination is suppressed, because he is held down to the picture, — whenever he begins to imagine a scene, the remembrance of the picture cuts across his images, and by its greater strength thrusts them out of consciousness. The reading of *Robinson Crusoe* may wholly fail of its due effect upon a child by reason of unimaginative cuts. **Book illustration.**

Lytton's *Last Days of Pompeii* may be cited as a book which shows imagination on the side of the author, and demands it on the side of the reader. Thackeray speaks of the "wonderful ingenuity" with which Lytton "illustrated the place by his text, as if the houses were so many pictures to which he had appended a story." A good part of Mr. Kipling's strength lies in his power to make the reader see, as if with the eye of outward perception, the scenes depicted in his stories.

What was said above of book illustrations applies equally well to the picture-jokes that abound in the comic papers, — the series of pictures which trace the course of some humorous incident. Sometimes the artist leaves much to the reader's imagination; oftener, however, the incident is portrayed in so many stages, with so much detail, that one almost hears him say: "*You* have no imagination; I must come down to your matter-of-fact level." The consequence is that what should have provoked laughter calls forth resentment.

Active or creative imagination.

§ 87. **Active Imagination.** — In active imagination, the imaging has been *preceded* by a state of active attention. When a sculptor resolves to chisel a Siegfried, *e.g.*, he reviews attentively the whole of the Siegfried legend, picking out a feature here and a feature there, and finally combines the traits selected into an 'ideal' image. This actively formed image is expressed in the statue. So when an actor wishes to render the part of Hamlet, he scrutinises every word and action that is set down in the play, and actively 'lives himself into' the character. The natural, easy, 'of-course' presentation that he gives when his study is over is the expression of the total Hamlet-image that has been taking shape during the state of active attention. Once more: when a writer of romance sets to work upon a tale, he labours at every detail of his plot as if it were a mathematical problem to be solved. The story, which flows so easily as we read from event to event, — all the threads of incident converging of themselves, as it seems, towards the supreme incident of all, — this story is the verbal translation of the images resulting from all the antecedent drudgery. In short: wherever there is 'creation,' whether it be in painting or sculpture, in music or in literature, in the mechanic arts or in science, the creation is the image-product of a long term of active attention.

Walter Pater, the greatest master of polished English prose that the century has seen, laid it down as a rule of good writing that one should acquire an instinctive feeling for the metaphors contained in words. That is, one should steadily keep in mind the literal meaning of words like 'involved,' 'insipid,' 'essay,' 'exasperate,' etc., until the writing of the word came to be always and invariably connected with the arousal in consciousness of an image, picturing its root meaning. When we want to copy a diagram, he said, we lay tissue-paper over it, and trace its outline through the paper. Words should be tissue-paper tracings of the writer's images; and should be so true to those images that, when the reader lays the paper over *his* images, they correspond just as truly to these. — Notice that this is a matter of secondary passive attention with the writer, while it may be a matter either of primary or of secondary passive attention with the reader. **Style.**

The word 'creation' points to a characteristic difference between imagination and memory. Memory, whether it is visual or not, is always bound down to the representation of actual past events. The representation may not be correct: we may have forgotten parts of the event, and features may have been added to our idea of it, by association, which are really imagined features: but none the less reference to the past is implicit in the very notion of memory, and the mark of familiarity inclines us to trust what memory tells us. Imagination, on the other hand, has a certain freedom about it; we need not image a past experience, but may put things together 'out of our own heads' and not as they have ever occurred. **The difference between imagination and memory.**

The difference has its root in the nature of passive imagination. As you read, *e.g.*, an author's description of his heroine, you read about her hair, eyes, hands, etc., *succes-*

sively; and you consequently image her beauties successively. The hair is seen by itself, the eyes by themselves, the hands by themselves; and each of these separate images is now at your disposal for future associations. Had you seen the heroine, you would have remembered her by a single, total image. — Having your total images thus broken up into detached part-images, you can imagine centaurs and satyrs and mermaids. And when you go from passive to active imagination, — when you are working over a mass of material for some artistic purpose, — the part-images that you select naturally fall into connections of their own; the result is something new, something which does not copy experience.

The limits of imagination. Notice, however, the limits of imaginative creation. (1) The law of imaginative connection is the law of memory and association over again; there is no new 'power' or 'faculty' of putting images together. (2) The images themselves are the images used in memory: there is no intrinsic difference between the memory-idea and the imagination-idea. You cannot imagine a colour, over and above the colours that you know: the most you can do is to think of the known colours as mixed in unfamiliar ways.

Hawthorne's Preface to *The House of the Seven Gables* gives the reader an idea of the mechanics of active imagination; and, if read together with Mr. Lathrop's Introduction, shows the interaction of passive and active attention in the construction of a story. Poe's paper on "The Philosophy of Composition," whether it be wholly or only partly sincere, contains a great deal of sound psychology.

In illustration of the effort of attention that must precede active imagination one may cite the story told of M. Puvis de Chavannes. The painter was to decorate the walls and ceiling of a room in fresco. Before setting to work, he spent several days in earnest contemplation of the bare surfaces. When remonstrated with for this 'waste of time,' he replied: "I have to see my picture before I can paint it." — When Sir Henry Irving is rehearsing a new part, the stage becomes gradually strewn with crumpled fragments of paper, on each of which some 'point' of action or emphasis has been jotted down, — material evidences of the labour in art which the same art when perfected conceals.

Associated ideas and affective processes in imagination.

No image is intrinsically an image of imagination (p. 189); the forming of the imagination-consciousness requires the presence of associated ideas and of a mood. The associates are those of the memory-image, *minus* their definite temporal and spatial coefficients: part-images are associated, with or without effort, to make a total image which does not correspond, *as total image*, to any particular event of previous experience. As for the mood: while the perception or idea which starts the series of images in passive and active imagination (the printed page of the novel, a photograph of the Bayreuth stage, or what not) may be wholly or partly unfamiliar, the images, of themselves, always bring the at-home mood with them, and in active imagination a specific form of it, the mood of intellectual ease (§ 97).

Sometimes, however, the arousal of this mood is prevented: in passive imagination by the novelty, alarming nature, etc., of the central perception or idea; in active imagination by the carrying over of active attention from the materials of imagination to the finished product (dissatisfaction in failure to realise one's ideal).

Thus our visual idea of a coming examination (passive imagination) is made up of familiar images. But other associates of the word 'examination' may be so disquieting that the mood of at-homeness gives place to that of anxiety. Again: if the sculptor has failed to image his Siegfried distinctly (active imagination) after his active analysis of the Siegfried tale, he will realise that he 'might have done better' with the theme, and be discontented with himself and his work. — *Cf.* what was said of recognition: § 79.

Questions and Exercises

1. The process of recognition can be studied in various ways. (1) Prepare a series of some 20 of the commoner scents. They can be procured from any chemist, and should be placed in small

phials, securely corked, and wrapped with paper so that the substance cannot be recognised by sight. Let the subjects smell them, one by one, and give an introspective account of the mental processes aroused by each. Within the series you will probably obtain recognitions of very different degrees of definiteness; from the puzzled "I know, but can't remember" to a clear-cut set of memory-ideas.

This experiment can be made to throw light upon mental constitution. Prepare a longer series of, say, 50 scents; and get as many different *orders* of scents as you can: flower perfumes, resins, fruit extracts, chemicals, etc. Experiment as before: but note what kind of scent appeals most definitely, and what most indefinitely, to each subject.

(2) The following experiment shows the importance of the word-idea, the name, in recognition. Have a photographer prepare for you a series of 7 papers, ranging from black to white through five greys. Pick out of the 7 a series of 5: black, dark grey, grey, light grey, white. Show these to the subject; and after 10 minutes' interval show one of the 3 greys, and ask what its place was in the original series. Mistakes will be very rare, for the reason that the paper is recognised not as a visual quality but by the name 'dark grey,' etc. — Now form a series of the 5 grey papers. As the possibility of naming has grown less, the accuracy of recognition will also decrease.

(3) The effect of lapse of time upon recognition may be tested as follows. Strike 4 notes at random from any octave of the piano After 10 sec. strike some one of the 4 alone, and let the subject write down his recognition of it as the first, second, third or fourth note of the original series. — Strike 4 others, from a different octave, and wait 20 sec.; then another 4, and wait 30 sec.; and so on. Note the point at which mistakes begin to be made, and the point at which recognition ceases to be possible. The subject should be cautioned to attend to the notes as *sounds*, and not to name them.

2. Memory, too, can be approached from various sides. (1) To test the accuracy of memory one may have recourse to two methods. The first is the method of description. Let a number of persons write out from memory a description of a scene familiar to them all. Then let the descriptions be compared, as if they were examination papers, and marks assigned for each of the points remembered. — The second is the method of com-

parison. The subjects are shown a picture of a landscape, a group of pieces of pottery, a furnished room, etc., or listen to a piece of music which contains a number of movements, changes of expression, etc. They are told, in each case, to attend carefully. After the lapse of, say, an hour, they are asked to recall the prominent features of the sight or sound complex. That done, the perception is repeated, and the memory compared with it.

Notice that the memory in this second case need not be a memory in kind: the picture may be remembered in words, *e.g.* The aim of the experiment is to discover how accurately a perception is remembered in the practical sense of 'remembering,' — how far it is available for use, in the idea-form that the particular nervous system most favours.

(2) The formation of a brain-habit may be roughly tested as follows. Learn a stanza of poetry by heart, reading it straight through again and again till you can just repeat it. Note the number of readings required. Wait till the stanza has been partly forgotten, — say, two days. Then relearn, in the same way. Note the number of readings required for accurate repetition. Let the memory lapse again: wait, say, four days. Then renew the readings, — and so on. You will find that the number of readings necessary for accurate repetition steadily decreases with the number of experiments made. For instance: though you may be very uncertain of the stanza on the seventh day, you will learn it in a less number of readings than you did on the third; and though you may have 'quite forgotten' it on the thirteenth, you will relearn it still more easily; and so on. This advancing easiness of learning is the mental side of the forming of a brain-habit.

3. To test your imagination, (1) read through a scene of some play which you have not seen upon the stage. Having read it, write out a commentary, saying where the characters are standing from moment to moment, how they group themselves, how they should be dressed, what the general colour-scheme of the scene should be, etc. Or (2) take a theme like 'the foundering of a passenger steamer,' or 'an alarm in the Turkish outposts,' or 'the exploration of a pyramid,' and make a word-picture of it, choosing your words as the equivalents of what your mind sees. Or (3) choose someone whom you know to be of imaginative turn, and describe to him a house or street or room with which

he is unfamiliar. When he has formed his mental picture, take him to the spot, and let him compare his idea with the reality. Your words, the translation of your images, are thus tested by retranslation into his images.

4. What are the literal meanings of the words *insipid*, *involved*, *essay*, *exasperate?*

5. Should maps be the sole visual aids allowed to the student of geography? Give reasons for your answer.

6. Are there any statements in this Chapter that seem to explain (1) the general conservatism of human society, and (2) the fact that old people are more conservative than young?

7. One sometimes hears it affirmed that we never really forget anything; that everything is remembered when the time comes for remembering it. How would you account for this opinion?

8. How does the image of expectation differ from the memory-image and the image of imagination?

References

James, *Textbook*, chs. xviii., xix.
Sully, *Human Mind*, vol. i., chs. ix., x.
Titchener, *Outline*, §§ 70–80.
Wundt, *Lectures*, Lects. XIX., XX.
Wundt, *Outlines*, §§ 16, 17 B.

CHAPTER XI

Thought and Self-consciousness

§ 88. **Language.** — Among the bodily disturbances that express emotion are certain movements of limbs and features (§§ 60, 61). And among these, again, we noted the presence of gesture movements. Remembering the close relation that emotion bears to impulse in the developed mind (§ 70), we are forced to believe that all these expressive movements are, in their origin, of the nature of impulsive actions. They are now more or less decayed, more or less weakened by having outlived their usefulness, more or less modified by the concurrence of the other forms of affective expression. But, in themselves, the wince and start and clenching of the fist are either impulsive actions or the direct descendants of impulsive actions (§ 74).

Emotion expressed by impulsive actions,

Most important of all the impulsive expressions of emotion, however, are movements that we have so far taken for granted, — the movements of the larynx which, in man, produce articulate speech. The spoken word is the medium of thought, as the visual idea is the medium of imagination. Hence the problem of the origin and development of language is one of prime importance for psychology.

and especially by articulate speech.

Gesture movements are of two kinds. The one kind serves principally to express the feel-side of the emotion (subjective gesture); the other to ex-

The two kinds of gesture.

press its situation-side (objective gesture). The 'sour look' upon the face is a gesture of the former sort; the pointing of the finger in fear, the threatening with the fist in anger, and the drawing of an object in rough outline by hand movements through the air, are objective gestures. Vocal sounds — cries, calls, exclamations — were associated from the first with both these classes of gesture; but their development in the two directions has been very far from uniform. Subjective speech to-day is inarticulate, or at most merely interjectory; objective speech, the speech whose function it is to communicate ideas, has attained an extraordinary degree of complexity in the various languages of the civilised world.

The origin of language is the warning-note.

The uttering of a cry under stress of emotion is not peculiar to man; it can be observed in very many of the lower animals, and especially in the social or gregarious animals. Moreover, when any one member of herd or flock sounds the 'danger note,' the whole company is alarmed. The sound is understood; it carries a *meaning* with it. Hence it is perfectly natural that the first attempts at the distinctively human language, at articulate speech, should have been understood. The utterance of one tribesman must have *meant* something to his fellow-tribesmen, — all the more as it was eked out by objective gesture.

Language possible only in society.

This mutual understanding within a herd or tribe is brought about, at the bidding of nature, by way of simultaneous association. The whole company has been subject at some time, let us suppose, to the emotion of fear. Every one is thus made familiar with the expression of fear in his neighbour. If, therefore, any individual 'shows' fear on a later occasion, his companions will catch the emotion from him, without themselves facing the situation which he is confronting. — Our understanding of a friend's conversation, then, is the outcome of a lesson learned lower down in the scale of life at the stern command of nature, a lesson in which failure to understand meant death.

We shall never know what were the first words that our ancestors pronounced; but it is highly probable that they were imitative, descriptive words; words which supplemented the gesture-drawing in the air by adding the sound which the object made. On the other hand, we are able to explain the fact that articulate speech has so far outrun its primitive associate, objective gesture, in usefulness. In the first place, sounds are 'free,' while the limbs are tied to the body. Hence more variation can be obtained from words than from gestures (*cf.* the superiority of auditory to tactual rhythm: § 47). Secondly, words are heard more easily than gestures are seen: they are clearer-cut, less ambiguous, can be better apprehended from a distance, etc. Thirdly, there is less individuality about words than about gestures; it is more difficult for two people to make exactly the same gesture than to give the same sound. Hence the word is the better symbol.

The earliest words.

The development of language.

Notice how the first beginnings of language illustrate Professor Wundt's statement (§ 70) that the general animal impulses are the earliest forms of emotion. The danger note may be regarded either as an expression of the emotion of fear, or as an impulsive action.

Various uses of 'thought.'

§ 89. **Thought.** — The word 'thought' is used in various senses. We say, "I can't think what his name is!" when we should say, in strictness, "I can't remember." And we say, "I can't think how you could have done it!" when we should say, "I can't imagine." Accurately defined, however, thought is the verbal counterpart of active imagination. Active imagination is thinking in images; thinking is active imagination carried on in words.

Thought the analogue of active imagination.

An account of the mechanism of thought will be nothing more, therefore, than the account of § 87, with 'words' substituted for 'images' in every case. The thinker comes to his subject-matter in the state of active attention; works over it, feature by feature; and finally reaches a verbal 'conclusion' as the result of the term of effort, — precisely as the painter faces his mass of image material, and produces his picture after a period of strenuous endeavour. And there is a further likeness. Thought, which in psychology is only one process amongst others, forms the sole subject of a special science, logic; and imagination, also one psychological process amongst many, is the sole subject of the science of æsthetics. Logic has reached a far higher level of development, however, than æsthetics; so that we have in this Chapter a good number of technical thought-terms to define and explain. The farther a science advances, the more complicated does its word-machinery become.

Words and images.

The difference between the word and the image is that the latter is photographic, a copy of reality, while the former is symbolic (§ 41), a sign of a reality which is wholly unlike itself. There is a close resemblance between the inventor's mental forecast of a machine and the actual machine; there is none between the word 'telephone' and the actual telephone. We must remember, however, that the earliest words were, in all probability, photographic, — sound-images: it was only by slow degrees that the word acquired its symbolic character. On the one hand, the *sound* of the word became modified by frequent use, by climatic conditions, by growing ease of articulation, etc.; on the other, the *meaning* became modified, as the idea which was originally expressed grew more definite

Changes of sound and meaning in words.

and accurate, or was altogether ousted by a newer idea. Change of sound and change of meaning have deprived words of their primitive naturalness, of their life-likeness to the ideas which are expressed by them. And as the sound-images gradually ceased to be sound-images, and became symbolic, other words came into use, which could never have been sound-images, — words, *e.g.*, which symbolised visual or tactual, not auditory impressions.

Can we 'think' without words? These facts help us to answer a very common question: the question whether we can 'think' without words. If we go back to the beginnings of thought, to the time when active imagination and thought were identical, we must answer yes, — active imaging can be done without words, and active imaging is the earliest kind of thought. If we take 'thought' in the narrower sense, the answer will be negative.

The judgment. § 90. **Judgment and Reasoning.** — The simplest thought-process, the unit of thinking, is the judgment. Certain material is presented, and worked over in the state of active attention. Some one feature, or some group of features, is selected, drawn out from the mass; is supplemented by associated ideas; and so forms a new total idea. Henceforth, in place of the original, undifferentiated material, we have a *judgment;* there are two complexes instead of one. We have, on the one hand, the original mass, in the state in which its working-over by the attention has left it, and on the other the supplemented aspect or feature of the mass. The first of these is expressed by a word which we call the 'subject,' the second by what is called the 'predicate' of the judgment. The holding together of the crude material, and the holding together of subject and predicate, are both alike matters of association.

Reasoning. It is but seldom, however, that the material is exhausted by a single judgment. As a rule, the forming of one judgment suggests the forming of another; so that we have a train of judgments, or *reasoning*. The train of judgments, like the train of ideas, is held together by successive association.

The splitting up of the material in judgment must not be understood as a simple halving, to be followed by an equally simple rejoining. In the first place, the feature seized upon by the attention is not taken bodily out of the material: it persists as part of the subject. In the second, the predicate is not merely the feature of the mass that the attention seized upon; it is that feature supplemented by other, connected ideas. — Let us take an instance.

Instance of judgment. Suppose that flints, which appear to have upon them the marks of human workmanship, are found in a Pliocene bed, which has apparently remained undisturbed. The archæologist is called upon to decide whether this is reliable evidence of the existence of man in Tertiary times. First of all he forms a series of judgments as to the disturbance or non-disturbance of the bed: feature after feature is attended to, and each in its turn supplemented by ideas derived from previous knowledge. The outcome of the judgment-series, of the reasoning, is a final judgment: "This bed has not been disturbed." The original total idea of 'Pliocene-bed-undisturbed' has been worked over; the 'undisturbedness' drawn out from it and supplemented; and the two ideas put together again as subject and predicate of a judgment.

The same course is taken with regard to the flints. The investigator starts with the total idea of 'humanly worked flints,' and transforms it into the judgment: "These flints are of human workmanship." Then the two final judgments are united, and the conclusion is reached that man existed on the earth in the Tertiary period.

This instance may seem to be unnecessarily complicated. The reader may know nothing of geological periods or the problems of archæology. Why should one choose such an illustration, instead of taking a simple sentence like: "The grass is green?"

The reason is that judging, thinking, is a process of rare occurrence in consciousness. Man has dubbed himself *homo sapiens*, and defined himself as 'rational animal'; but he rarely thinks. For we are, all of us, born into a society where judgments await us ready-made; every generation receives a heritage of judgments from the preceding generations. Hence facts that cost our ancestors immense pains to work out come to us as matters of course. Society is already organised: then we need not trouble ourselves to make judgments about social organisation. A form of religion is established: we need not judge for ourselves in religious matters. A code of conduct has been laid down: we need not judge in matters of conduct. The applications of scientific principle are to be seen all about us: we need not understand the principles,—we may take the steam-engine and the telegraph for granted. Life is made smooth for us by the accumulated work of past generations. And even if we wish to judge for ourselves, there are so many past judgments on record in books, and so many others to be had for the asking from our elders, that independent thought is difficult.—It follows from all this that propositions like "The grass is green" are not judgments at all; they do not express results which we have gained laboriously by active attention. That they have the form of judgment may be due either to the fact that they were judgments once, generations ago, or merely to the fact that we cannot utter more than one word at a time, and must therefore give the parts of our idea successively. It is only when (as in the instance given) a total idea is actively divided up that true judgment occurs.

Judgment a rare process.

It must not be supposed, however, that we think less than our forefathers did. They did not sit down, in any particular century, and actively discuss forms of social organisation and codes of conduct, thus arriving at a judgment which we sluggishly accept. Their thinking was done as ours is, little

But man *does* judge,

bit by bit. But this is the point: that thinking is confined for most of us, as it always has been for the majority of mankind, to some one corner of the field of knowledge, and to a few years of our life. Outside of our 'special subject' we accept what other people tell us; and when we have passed beyond early manhood, our thought moves but lazily even there, — we are slaves of the brain-habits set up in youth. When the channels of such acquired tendencies are supplied by numerous tributaries, when the train of habitual ideas is richly supplemented by associates, we have *talent;* when active thought continues into mature life, *genius.*

and this raises him high above the animals.

Again: we must not lose sight of the advantage that even a little thinking gives man over the animals. There is evidence that the higher animals are, at times, actively imaginative (§§ 31, 32). But it is highly significant that, although many of them have the physical means of speech, man alone has developed an articulate language, the vehicle of symbolic imagination or thought. The very fact that he can accept judgments ready made, that he can be passively attentive to groups of word-ideas, is a clear indication of his mental superiority.

The material which calls for a judgment to set it in order is termed an aggregate idea.

§ 91. **Aggregate Ideas and Concepts.** — The 'material' which is worked over and divided up by the attention in judgment or active imagination consists of perceptions, ideas, tags of meaning and what not, — a mixed medley of the processes derived from sensation. It is not an idea, in the strict sense of the word; sometimes, it is not even a complex of simultaneous associates; idea may follow idea within it, by successive association. Nevertheless, it has a peculiar singleness of character, due to the fact that the meaning of the central idea in the total complex remains the same throughout. It is therefore given a special name, *aggregate idea.*

Instances of aggregate ideas that we have had so far are those of Siegfried and his adventures, the playing of Hamlet, the plot of *The House of the Seven Gables,* Pliocene-bed-undisturbedness, humanly-worked-flintness. In each case the dominant idea of the aggregate, the 'topic' of thought, remains unchanged through all the changes of associated ideas. — A good illustration is afforded by the idea of the coming sentence that you have in mind before you speak. There must be some total idea already formed, or you could not carry your sentence to its end grammatically; but it is a *total* idea, a mass which has not yet taken on the judgment form.

The concept.

It cannot but happen, when one considers the constancy of man's physical surroundings, the routine character of daily life, that one and the same feature will attract the attention in a large number of aggregate ideas. In other words: there will be many judgments in which the subjects are different, but the predicates the same. A predicate which is common to several judgments is termed a *concept.*

The abstract idea.

The aggregate idea may be made up of images or of symbols (words, tags of meaning). The concept is always a symbolic process, and nearly always a word: when we speak of the corresponding image-process, we term it not concept but abstract idea. Thus the word 'horse' is a concept; it may be predicated of a vast number of animals. But the animal-picture in my mind which stands for the typical, standard horse is an abstract idea. The abstract idea, then, is made up of images which have attracted the attention in a long series of aggregate ideas.

The controversy concerning abstract ideas.

There has been much dispute, in the history of psychology, with regard to the nature of abstract ideas. John Locke (1632–1704), the founder of modern empirical psychology, speaks in his *Essay concerning Human Understanding* of the abstract idea of a triangle as an imagined figure which is "neither oblique nor rectangle, neither equilateral, equicrural, nor scalenon, but all and none of these at once." George Berkeley (1685–1753), who ranks only after Hume in the subtlety of his metaphysical thought, criticises Locke in these terms: "If any man has the faculty of framing in his mind such an idea of a triangle as is here described, it is in vain to pretend to dispute him out of it, nor would I go about it. All I desire is that the reader would fully and certainly inform himself whether he has such an idea or no. . . . The idea of 'man' that I frame to myself must be either of a white or a black or a tawny, a straight or a crooked, a tall or a low or a middle-sized man. I cannot by any effort of thought conceive the *abstract* idea above described."

What are the facts? (1) In many cases, there certainly may be an abstract idea of the kind that Locke describes. Take, *e.g.*, the abstract idea of 'horse.' If real horses are so much alike that I can at once recognise every separate specimen as a horse, there will evidently be distinct marks of 'horsiness' that can be represented in the abstract idea: a peculiar wavy outline, a peculiar posture, a mane, etc. My idea will not be the picture of any special horse, but a picture of average horsiness. (2) Where the individuals differ so much as the individual triangles do, no such idea is possible at any given moment. But an idea is a process: it need not all be present at the given moment. Hence I may have an abstract idea of a triangle in the sense that equilateral and scalene and isosceles triangles melt into one another, in quick succession, like dissolving views. The group of processes would mean 'triangle,' and not 'triangles'; and so might be fairly termed *an* idea. (3) As a rule, however, the abstract idea (while it still remains abstract so far as meaning is concerned) takes the form of the memory-idea of a particular object. When we learned geometry at school, we found in our text-books little equilateral figures which stood for the word 'triangle.' It is probable, then, that when we think of 'triangle' in the abstract we see one of these little figures. Our abstract triangle is not a triangle of all sorts, but an equilateral triangle. So our abstract horse will probably have a good deal of some particular horse about it. The abstract idea is on its way to become symbolic. (4) Since we are born into a world of words, we learn concept-words long before we learn to think, and associate them hap-hazard to the objects first called by their names. In after life, the picture of this hap-hazard object often serves as the abstract idea corresponding to the concept. Thus the author's abstract idea of 'hour' consists of the picture of a small outline square drawn on a white background; and this square is one of the squares of the daily report-cards upon which the marks for every hour's work were entered at the first school that he attended. In a case known to him, the abstract idea of 'squareness' is a mental picture of one of the wood-squares in which honey-comb is sold. A symbolic picture of this kind may under certain circumstances oust the word, and itself take on the functions of the concept.

§ 92. **Comparison, Relation and Abstraction.** — In the logical treatment of thought we find frequent mention of the processes of comparison or discrimination, of relation and of abstraction. The terms serve a useful purpose in logic, since they enable the logician to divide up his subject into parts, and to discuss it part by part. On the other hand, they have been the source of much confusion in psychology. Psychologists have been inclined to think that, as they stand for different processes in logic, they must also stand for distinct processes in psychology; so that the mind must be regarded as endowed with a peculiar power of discrimination, with another power of relating, etc., — or at least that thought or judgment must be ranked as a fundamental psychological process alongside of sensation and affection.

The logic of thought and the psychology of thought.

Plainly, however, psychology cannot allow logic to settle a question of this sort. We must find out, for ourselves, what the words mean when they are translated into psychological processes; and then we must decide for ourselves (by an appeal to introspection) whether or not the psychological processes are of a new kind, or of a kind already familiar to us.

Comparison,

There is no difficulty in discovering what goes on in our own minds when we compare and relate and abstract. (1) When we *compare*, we look at two objects or two ideas attentively, the one after the other, and presently find in consciousness the word 'like' or 'different,' set in the mood of ease or of vague discomfort. That is all. Sometimes the comparison is passive: the word arises without thought, by way of successive association. Sometimes it is active; the word arises as the predicate of a judgment.

relation,

(2) The same thing is true of *relation*. When one idea succeeds another in the train of ideas, the two are by that very fact brought into relation with each other: this is passive relating. And when the feature drawn out of the aggregate idea by the attention has been supplemented, and the new complex is predicated of the old, the two are, again, brought into relation: this is active relating.

abstraction,

(3) Lastly: when the attention has drawn the predicate-feature out of the aggregate idea, the process of *abstraction* has taken place. We have 'abstracted' the feature, 'abstracted from' (neglected) the rest of the idea.

The reader will recall the parallel discussion in the case of recognition (§ 79). When a perception has the mark of familiarity, there is a 'recognition' before us: we find no peculiar process of recognising, over and above the addition of the familiarity mark. So when two ideas associate, there is a relation before us: we find no process of relating, over and above the associative connection. Red and yellow are related, because they arouse the same mood in us, *i.e.*, connect with the same organic sensations; the ideas of 'greater' and 'less' are related, because they connect with the same general concept of magnitude; etc. The formula of relation is always *ab-bc*.

Note that, while the natural moods of the comparing consciousness are as given above, they may be modified by circumstances: *cf.* p. 191.

and their corresponding concepts.

The processes themselves, then, are all old friends. Nevertheless, they offer a new problem for solution. How do we come to *name* them? The names 'comparison,' 'relation,' etc., are evidently concepts; but, as evidently, they are concepts of a different order from those mentioned in § 91. The concept 'horse' has an abstract idea corresponding to it, an idea made up from many perceived horses. But 'relation' and 'abstraction' are just words; there is nothing in perception, nothing in visual idea, that corresponds to them. Granted that two associated ideas *are* related, how did we ever come to attend to the fact of their relation as something quite apart and distinct from them and their meaning?

The question is one that psychology is, undoubtedly, called upon to answer. And it can be answered only by following out the history of mental development, and more especially of mental development as borne witness to by language. This history shows (*cf.* § 61) that all concepts were originally of the 'horse' kind, words that stood for definite abstract ideas. As thought advanced, however, words were used more freely, with less and less of reference to any corresponding abstract idea: objects of thought took their place alongside of objects of perception. Now, we have a large stock of verbal ideas, all with clear-cut and valuable meanings, which stand not for things or processes of the outside world, but simply for our own interpretations of these things and processes, for thought-objects; and among them are to be counted the concept-ideas of relation and comparison and abstraction with which logic, the science of thought, has to deal.

To trace out the development of concepts in detail would be to write a Chapter, and that not a short one, in the psychology of language (see § 120). We can no more do that here than we can write Chapters in the psychology of custom or art or law: it would take us too far afield. A single instance must suffice.

The history of a concept-word.

If a logician were speaking of the relation which the concept 'whiteness' bears to the substance 'snow,' he would call it an *attribute* of that substance. An attribute is a characteristic or property or mark of a substance. How has the concept been formed?

We find in English, German and Latin the words *thorp*, *Dorf* and *tribus*, which are all, philologically, the same word. *Tribus* means 'tribe'; and *thorp* and *Dorf* mean 'village.' The original meaning of the three, then, is that of a community, a society of men. — In Latin we find the verb *tribuo*, 'to assign' or 'give'; and the past participle of this is kept in the English *tribute*. 'Tribute' means 'what is done by the tribe'; and 'what is done by the tribe' is to pay for protection, to give or bestow something upon a chieftain or a more powerful tribe in return for favours received. The special meaning retained in 'tribute' has become a general meaning ('to give,' simply) in the verb *tribuo*. — Finally, from *tribuo* comes 'attribute,' that which is assigned or granted to something. It is a long road that leads from the village community through the assessment of the community to the logical characteristic; but it is without doubt the road that this concept travelled.

§ 93. **The Concept of Self.** — We have in the concept of self an exceedingly good instance of concepts in general. For on the image side we have various stages, from the perception of self to its abstract idea; and on the word side similar stages, from the concept corresponding to the abstract idea up to a concept that has been refined to the utmost limits of logical subtlety. It will be worth while, therefore, to find out as definitely as we can what comes into consciousness along with the words 'I' and 'me' and 'my.'

The perceived self.

(1) The primitive, perceptual self is made up chiefly of a mass of cutaneous and organic sensations, partly

of visual sensations, — the whole overlaid with an affection. Your 'self,' the self that you perceive at this moment, is probably composed of pressures, temperatures, strains, breaths, etc.; that is, a certain total effort or comfortableness or headachiness: together with the visual perception of hands and clothes. That is *you*, as you perceive yourself. Perhaps you were not thinking of yourself at all until you began to read this Section; but now that your attention is called to yourself, the perceived self comes out plainly: you realise that your glasses need adjusting, that your position must be shifted, that your forehead had better be relaxed, that your collar is sitting too tightly, that you have set about reading too soon after dinner, and so on. All this mass of felt sensations is yourself.

Dr. Charles Mercier, writing of the perceived self from the medical standpoint, emphasises the part played by sensations from the alimentary canal. "Self means stomach," he says. "The function of assimilating food is the most fundamental of all the functions; it is antecedent even to locomotion and propagation. Hence anything which directly affects the organism as a whole affects the stomach," — and it is the alimentary organic sensations that loom largest in the perception of self. Flechsig, too, emphasises the importance of the cortical centre for touch and organic sensation in the make-up of the perceptual self.

(2) The idea of self consists principally of a visual picture of one's body and its usual surroundings. You see yourself seated in your accustomed chair, clothed in your usual way, busied about your usual occupations. This self-figure is seen upon a dim and shifting background made up of memory-images of past experiences. **The idea of self.**

It is not often, however, that the self comes to mind so definitely as this description would imply.

The abstract idea of self.

The idea is for the most part an abstract idea: the figure is more shadowy, and the background clearer. What precisely the background is will depend upon the direction of thought at the time: it may be a professional or a social or a moral or a national or a religious background. In other words: the self-consciousness is made up of the verbal idea 'I' (the concept), of a vague picture of the clothed figure, and of a mass of images of professional experiences, social incidents, etc.

How shadowy the figure-self may become is amusingly illustrated by a story that Professor Mach, of Vienna, tells in his book on the Analysis of Sensations. "I got into an omnibus one morning," he writes, "after a tiring night on the train, just as some one else was entering from the far end. 'Some broken-down schoolmaster,' I thought. It was myself: there was a large mirror opposite the omnibus door." The professional figure was recognised before the personal figure.

The logical self.

(3) Finally we have the logical self, the bare concept of the 'I' or the 'ego.' This has been gained by abstraction from the social, professional, moral, etc., self-concepts; it is a sort of short-hand term for them all. Its meaning differs very considerably in different philosophical systems. Psychologically regarded, it stands on the same level with the concepts of relation, etc.: it does not correspond to any thing or process of the outside world, — the self-concept which does that is the concept discussed above under (2), — but stands simply for the philosopher's special interpretation of selfhood, *i.e.*, for a thought-object.

The difference between this 'I' and the preceding 'I' may not be quite clear, at first. It becomes clear, when once the two I-experiences have been compared. However far the first I-concept is removed from the perceived self, it is still the concept of oneself, — you 'feel' that it is *you* that are meant. As you read about the other 'I,' you are left quite cold; it does not strike you that the author means *you:* the 'I' is just an indifferent word with an indifferent meaning, like 'reality' or any other philosophical term.

§ 94. **Self-consciousness.** — A self-consciousness is a consciousness in which the concept or idea of self, or some phase or part of it, is present in the state of attention, and thus serves as a centre of association for other ideas. Thus the introspective consciousness is a self-consciousness: the psychologist attends to some mental process which belongs to himself, which forms part of his experience and can never form part of that of another man (§ 5). In everyday life, the self-consciousness is usually a highly affective consciousness; when we think of ourselves, it is with marked self-satisfaction or with equally marked humiliation. These processes, 'sentiments' as they are called, will occupy us in the following Chapter.

The self-consciousness.

The discussion of self-consciousness filled a large place in the older psychology, in which the mind was supposed somehow to turn inwards upon itself and observe itself, — being endowed with a peculiar 'inner sense' which enabled it to do this. Modern psychology makes no mention of an inner sense: for it, introspection means simply attentive experiencing, attentive remembering and attentive translation into words (Ch. II.).

The problem of self-consciousness in the old

For us, therefore, the problem of self-consciousness resolves itself into the question how the idea and concept of self are formed. We have seen that the earliest idea of self is the idea of the bodily self; and the body, whether it be our own body or another, is an object of perception,

and in the new psychology.

an object of the outside world (Ch. VI.; *cf.* § 58). The idea of self is therefore formed at the bidding of nature, as all ideas are. On the other hand, the question how the concept of I-ness, of selfhood, came to be formed is much more difficult. The answer to it involves an elaborate enquiry into the conditions of primitive life and the growth of language (*cf.* the concept of 'attribute'). There can be no doubt that the *social* form of life and (what is a result of this) the giving of *proper names* to individuals are among the principal conditions under which the concept took shape.

'Self-consciousness' in the popular sense of nervousness, awkwardness, bashfulness, etc., is one of the instinctive fears (see § 75). A good account of it is given by Professor Mosso, in the Introduction of his work on Fear.

Questions and Exercises

1. What animals do you know to be capable of articulate speech? Have you ever observed an animal signal to another by sound? What did the signal mean? How many different signal-sounds have you known an animal to employ?

2. Can you give instances of 'suggestion' — of the catching of an idea or emotion by a number of individuals, as if by infection — in human society?

3. We said that "articulate speech has far outrun its primitive associate, objective gesture, in usefulness," and gave reasons. But we saw in § 61 that the sour look (subjective gesture) persists after the word-metaphor has disappeared: the development has proceeded in just the opposite direction. Why should this be?

4. It is said that the letters of the alphabet are derived from hieroglyphics, *i.e.*, pictures of actual objects in the external world, and have only by very slow degrees become sound-symbols. What psychological process would this evolution illustrate?

5. Can animals reason?

6. Suppose that you ask someone a question, and receive an answer. The answer will have the form of a judgment. Can you tell, by the way in which the answer is given, whether it is a true judgment or a mere hearsay answer? — How, in your own

experience, does a judgment that you have formed by effort of attention differ from a statement taken 'on trust'?

7. What was the aggregate idea in the author's mind when he set to work to write the first Section of this chapter?

8. What method would you use, if you were enquiring into the psychological development of the concepts of 'likeness' and 'difference'?

9. Write out a careful introspective description of (1) the perception, (2) the idea and (3) the abstract idea that you have of yourself.

10. Whenever the abstract self of § 93 (2) comes clearly to consciousness, the idea is accompanied by a special group of sensations. These are at times so vivid as almost to change the idea of self to a perception of self. What are they?

11. Animals may be actively attentive, actively imaginative. Man stands above them, in this sphere, because he thinks, *i.e.*, uses words to symbolise the images actively attended to. Man, also, has passed beyond active to secondary passive attention; the animals have not. — What biological reasons can you offer for this progress from active imaging to active symbolising, and from this again to secondary passive attention?

12. Give instances of change of meaning in words, due (1) to objective and (2) to subjective conditions.

13. What is the psychological difference between the 'analytic' and the 'synthetic' judgment?

14. What is meant by the 'unity of consciousness'? Would 'centralisation' be a better term than 'unity'? Why?

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CHAPTER XII

Sentiment

Sentiment and emotion.

§ 95. **Sentiment.** — The emotion bears precisely the same relation to the sentiment that the assimilation bears to the judgment, or passive to active attention. In emotion we are brought face to face with an incident or situation, which overwhelms us, takes possession of us, — in other words, is passively attended to. A very strong and very complex feeling is formed, and rendered still stronger and still more complex by the organic sensations that come with our bodily attitude towards the situation. In sentiment, we are also brought face to face with an incident or situation; but it is of a kind that demands active attention, effortful attention now to this part and now to that. We take possession of it, so to speak, in place of its taking possession of us. Otherwise, the sentiment resembles the emotion. A strong and complex feeling is formed, and reinforced by organic sensations. The bodily expression of sentiment is of the same kind as that of emotion.

Formation of sentiment.

The core of an emotion, then, is a simultaneous association of ideas; the core of a sentiment is a judgment or an active imaging. The sentiment stands upon a higher level of mental development. There is no other difference.

We find the same difficulty in investigating sentiment that we found in investigating thought. Just as there are many apparent judgments that are not really thought at all, but mere associations, so there are many apparent sentiments that are based not on a true judgment-process but on assimilation. And again: just as active attention lapses into secondary passive attention, so does an affective state that begins as sentiment lapse into emotion. Hence in describing and identifying the sentiments we must be constantly on our guard against confusing them with emotions based upon ready-made judgments, and with emotions based upon judgments which were once really judgments, but have now become matters of habitual association.

Tradition and habit: their effect upon sentiment.

For instance: my 'sentiment' of honour may never have cost me a moment's effort of attention. A definition of honourable conduct has come down to me, by tradition, and I accept it without thought. Conduct-situations take possession of me: I face them by an emotion. Or again: my 'sentiment' of beauty may have once been a real sentiment. I may have laboriously studied art-canons, and studiously dissected art-forms by active attention. Now, twenty years after this labour, I have nothing but an emotion of beauty; I am instinctively pleased or displeased by works of art, without making the least effort to analyse them. — In form, then, I have a moral and an æsthetic sentiment; in reality, I have two emotions.

Here as everywhere in mental life the lapse of active into passive may be very good or very bad for us. If we pass on to new activity, as soon as the once-active has become passive, — using the old material as the foundation of new judgments, and so rising higher and higher in knowledge the more of this passive material we accumulate, — then we are turning human endowment to its full and proper account. If we are content with the passive, resting on the foundation built for us by our ancestors, we are no better than the animals.

§ 96. **The Forms of Sentiment.** — There are four groups or classes of sentiments: the intellectual or logical, the moral or social, the religious and the æsthetic.

Intellectual, (1) The situation which calls forth the intellectual sentiments is made up, not of coexistent objects and concurrent processes of the outside world, but of thought-objects, of our own interpretative processes. We never look at a scientific 'fact' except through the eyes of a theory. It is the theory, the thought-situation, the group of concepts, that calls out the intellectual sentiment. And the central judgment, round which the affective processes gather, is the judgment 'This is true' or 'This is untrue.'

social, (2) We have our ideals of social conduct, as we have our scientific theories. The situation that evokes a social sentiment is a behaviour-situation, the agreement or disagreement of actual conduct with our ideal of conduct. A man's actions as member of a family or profession, as citizen of a town or nation, etc., give rise to the judgment 'This is good' or 'This is bad behaviour.' This judgment forms the core of the social sentiments.

religious (3) The situation in the religious sentiment, like those in the intellectual and social sentiments, is an ideal situation, made up of thought-objects and interpretations. The central judgment differs very considerably in different religions, and in the same religion at different levels of development. In general terms it runs 'This is right' or 'This is wrong in the eyes of God.'

and æsthetic sentiments. (4) The judgment that underlies the æsthetic sentiments is 'This is beautiful' or 'ugly.' The situation which calls out the judgment may be wholly ideal (a 'pretty' theory, a 'neat' argument), or may be partly perceptual and partly ideal (a beautiful landscape, symphony, etc.).

Practical importance of sentiments.

Two points call for notice here. (1) Notice that there is an obvious reason for the existence of the first three kinds of sentiment. It is of great practical importance for us to know whether theories are true or untrue, whether our conduct will be approved or disapproved by our friends and acquaintances, and whether we are living our whole life rightly or wrongly. If our theory is untrue, if it has outrun or neglected the facts of the world, we shall not be able to adjust ourselves to these facts; our inventions will not work, our crops will not come up, etc. If we act badly, life will be made unpleasant for us, by imprisonment, by withdrawal of friendship, etc. If we believe in a divine retribution, and yet direct our whole life amiss, run counter to the divine will, we must expect to suffer for it. — On the other hand, there seems to be no such reason for the existence of the æsthetic sentiments. We cannot say, offhand, what their practical value is; we must make a special investigation (§ 100) to discover it.

Affective qualities in sentiments.

(2) Notice that the sentiments, like the feelings and emotions, fall into two sets: a pleasurable and an unpleasurable set. They give evidence of the two affective qualities, pleasantness and unpleasantness, but not of any others.

Not very much is known about the sentiments. More work has been done upon the æsthetic group than upon the social, intellectual or religious; but even there our knowledge is uncertain.

Higher and lower feelings.

The sentiments are sometimes spoken of as the 'higher' feelings, in contradistinction to the emotions and the feelings proper, which are 'lower' feelings. We may accept the words 'higher' and 'lower,' if we interpret them to mean simply 'more complex' and 'less complex.' On the other hand, we may not use them in the sense of 'more commendable' and 'less commendable': such an interpretation takes us out of the sphere of psychology into that of ethics (§ 121).

Intellectual sentiments: qualitative, temporal

§ 97. **The Intellectual Sentiments.** — These sentiments show very clearly how nearly related sentiment in general is to emotion. We have qualitative and temporal sentiments, as we had qualitative and temporal emotions. More than that, we have a distinction of objective and subjective forms among the qualitative sentiments, just as we had among the qualitative emotions.

At the same time, the difference between sentiment and emotion is brought out with equal clearness. There can be no *midway* emotion: an emotion is either joy or sorrow, either hope or fear; there is no new emotion that is something between the two, but is neither the one nor the other. This is a necessary consequence of the fact that the emotions are formed in the state of passive attention; we are absorbed, overwhelmed by the situation. But suppose that we face the situation by a judgment, by active attention. It is clear that, as the various incidents are attended to, different predicates may suggest themselves. Here is a theory: is it true or untrue? Facts a, b, c speak for it; facts x, y, z against it.

and oscillatory.

The attention oscillates, uncertainly, between the two predicates; and the result is an *oscillatory* sentiment.

The following are the principal qualitative intellectual sentiments, so far as they have been worked out. The names of the pleasurable sentiments are printed in capitals; the oscillatory forms in italics.

(1) Objective Sentiments:
- (*a*) Objective forms: AGREEMENT, *obscurity*, contradiction.
- (*b*) Subjective forms: EASE, *confusion*, difficulty.

(2) Subjective Sentiments:

(*a*) Subjective forms: BELIEF, *doubt*, disbelief.

(*b*) Objective forms: TRUTH, *ambiguity*, falsehood.

The series BELIEF, *doubt*, disbelief is perhaps that of the greatest practical importance. The corresponding moods have all received names: ACQUIESCENCE, *indecision*, incredulity.

Chief among the temporal intellectual sentiments is that of curiosity. It is resolved upon qualitative sentiments as follows:

Curiosity

(fulfilled)	(deferred)	(unfulfilled)
SUCCESSFUL thought	Baffled thought	Failure of thought

Curiosity, the desire to know for the sheer sake of knowing, is a human offshoot of the instinct of inquisitiveness. This latter is one of the universal animal instincts; life depends upon having a full knowledge of one's surroundings.

The intellectual attitude has grown to be so habitual with civilised man that, unless we have a thorough grasp of the way in which active attention passes over into secondary passive attention, we may be tempted to look upon it as something primitive and original, rather than as the final product of the accumulated judgments of generations. Take the case of belief, *e.g.* What could be simpler, at first sight, than the consciousness which finds expression in the phrase "I feel sure"? 'Feeling sure' seems as natural as 'feeling cold.' So we find Hume saying that belief is nothing else than the having of a clear idea: when we have a clear idea, then we are believing. "Belief," he declares, "is nothing but a more vivid, lively, forcible, firm, steady conception of an object than the imagination alone is ever able to attain." And Professor James, making out a list of the characteristics that an idea must have if it is to be believed, puts down in the first place "coerciveness over attention, or the mere power to possess consciousness."

The psychology of belief.

Now it is true that we, to-day, may 'believe' without judging, and 'feel sure' without having the sentiment of belief. We approach every fact with centuries of belief and disbelief upon us; we fall, instinctively, into a believing or disbelieving or doubting attitude. Nevertheless, there was a time when there was no belief. Animals do not believe or disbelieve; they have not advanced far enough in mental development. They just accept things: pleasantly, if the things are familiar, unpleasantly, if they are unfamiliar. Belief arises much later, and falls back into the 'feel-sure' attitude much later still. As reflex movement developes out of impulsive action, so does the reflex feel-sure attitude develope out of numberless true beliefs, the sentiments of our dead ancestors.

Social sentiments.

§ 98. **The Social and the Religious Sentiments.** —The social sentiments also fall into subjective and objective groups: the former including the various forms of self-approval and self-disapproval, the latter indicating differences of attitude towards the behaviour of others. They are, however, exceedingly difficult of classification, for the reason that they are exceedingly liable to lapse into emotions. The duties that every member of a society owes to its other members are so drilled into us, in early life, that later on we take social situations for granted, and react upon them by passive attention. It would be impossible, in most cases, to find a difference, *e.g.*, between guilt (sentiment) and fear (emotion), or between shame (sentiment) and chagrin (emotion).

We may distinguish the following social sentiments:

(1) Subjective:

- (*a*) subjective: PRIDE, modesty; objective: POWER, impotence.
- (*b*) subjective: INNOCENCE, guilt; objective: JUSTICE, injustice.
- (*c*) subjective: DUTIFULNESS, undutifulness; objective: HONOUR, dishonour.
- (*d*) subjective: VANITY, shame; objective: EMULATION, self-effacement.

(2) Objective:

- (*a*) objective: TRUST, distrust; subjective: SECURITY, insecurity.

(*b*) objective: PATRONAGE, indebtedness; subjective, FREEDOM, restraint.
(*c*) objective: MAGNANIMITY, jealousy; subjective: DISINTERESTED PLEASURE, envy.
(*d*) objective: FORGIVENESS, revenge; subjective: COMPASSION, hard-heartedness.

There are, doubtless, many others. But the very fact that sympathy and antipathy are emotions — that certain social situations appeal by rights only to the passive attention — makes it difficult to draw any hard and fast line of division between social sentiment and emotion.

Religious sentiments.

It is still a matter of debate whether the close connection that obtains between religion and morals in modern society is a recent development, or has persisted from the earliest forms of human community to the present day. In all probability, however, the roots of religion and of morals are planted in different soil, and the growing together of the two is a matter of comparatively recent occurrence (see § 120). Theoretically, therefore, we must distinguish the religious from the moral sentiments, however closely they may be interwoven in our everyday experience.

The following are some of the religious sentiments:

(1) Objective.	Obj. form.	Subj. form.
	Awe	Humility
	Reverence	Unworthiness
	Rebellion	Disobedience
	Faith	Exaltation.
(2) Subjective.	Subj. form.	Obj. form.
	Sinfulness	Remorse
	Spiritual Pride	Self-righteousness
	Contrition	Repentance.

Æsthetic sentiments: beauty.

§ 99. **The Æsthetic Sentiments.** — There are two pure or simple æsthetic sentiments, those of beauty and of ugliness. And the æsthetic judgment may be passed in two perceptual fields, those of sight and of hearing. We find beauty in visual form (architecture, statuary, natural scenery), in colour (painting, stage grouping, landscape), and in visual movement (dancing); as well as in musical form (rhythm, etc.), harmony and melody.

Symmetry and the golden section.

A good deal of work has been done in psychological laboratories upon what is called 'the æsthetics of simple forms.' Series of figures are prepared (crosses, ovals, rectangles, etc.), the proportions varying slightly from figure to figure, and the subject is required to say which figure in the series is the most pleasing. It is found that the proportions chosen are (*a*) those of 1 : 1, *i.e.*, those of symmetry, and (*b*) those of (approximately) 5 : 8, those of the 'golden section,' as it is termed. Taste, that is, is by no means so variable as is commonly supposed.

The precise explanation of these facts is uncertain: we are not even quite sure whether the judgments are really æsthetic judgments, or whether they depend upon such things as ease of eye-movement. The history of music, however, gives us a parallel. The harmony that was judged to be most beautiful in the primitive stage of harmonic music was that of the octave. Nowadays, the octave seems thin and poor: the most beautiful harmony to us is that of the major third (*c–e*). It may be, then, that the equal division of symmetry represents the primitive standard of beauty, and that we have grown to see the beauty of the golden section, as we have to hear that of the major third.

Sublimity, tragedy and comedy.

There is a third sentiment, that of sublimity, which is partly æsthetic and partly intellectual, social or religious. A fourth, that of tragedy, is part æsthetic and part social; and a fifth, that of comedy, is part æsthetic and part intellectual.

When we say that a scene or an action is 'sublime,' we usually mean that our sentiment of beauty is mixed with the religious sentiment of awe. Sometimes, however, it is mingled with the sentiment of truth or of power. In no case is sublimity a pure æsthetic sentiment.

The tragic sentiment has as its central judgments 'This is beautiful' and 'This is unmerited.' Tragedy is therefore a mixture of beauty and injustice (social sentiment). The sentiment of the comic or the ludicrous appears to be of the oscillatory character (§ 97). We have the judgments 'This is pretty' and 'This is contradictory' in quick succession.

Psychologists have always found it easier to give illustrations of these sentiments than to explain them. As a matter of fact, full explanation is at present impossible. We must wait (1) till the experimental method has finally decided for us how many qualities of affection there are, and (2) till the historical development of art, in all its branches, has been more thoroughly worked out.

Instances. In the meantime, we may look at some instances of æsthetic sentiment in literature. The figures of Hamlet and of Lear in Shakespeare, and of Antigone in Sophocles, are eminently *tragic*. Even at moments when we are most fully appreciating the beauty of the presentation, the sentiment of injustice crops up: why should these people suffer so? we ask; what have they done to deserve their fate? Dogberry and Verges, the 'two foolish officers' in *Much Ado about Nothing*, are unsurpassably *comic*. There is an æsthetic fitness or rightness about what they say; but when we consider the sense, all is contradiction, — we have what Professor Sully calls a "delicious incongruity of ideas." To take one case:

"*Dogb.* (to the Watch). You are to bid any man stand, in the prince's name.

Watch. How, if a' will not stand?

Dogb. Why, then, take no note of him, but let him go."

For instances of the sentiment of sublimity, the reader must search his own experience. The author has felt it most keenly, in its form of awesome beauty, when hearing Beethoven's Ninth Symphony or Wagner's *Götterdämmerung*; when standing on a mountain-top, watching a thunder-storm pass beneath him; when at sea, on a calm starlight night; when passing through a deeply cleft ravine, etc. There is a solemnity pervading the beauty in all such experiences. — An instance of sublimity, in the sense of mingled truth and beauty, which will appeal to all who have the artistic temper, is afforded by the Venus of Milo. The figure is so perfectly beautiful that we should feel awed by it, were there not with all the stateliness a womanly touch, a winningness, that puts us at our ease in its presence. The Dorian Girl (the 'Diana of Gabii') is beautiful, graceful; but we do not feel her beauty in the same way as we do that of the Venus. The same sentiment arises when one stands before a Velasquez. "Everything Velasquez does," says Mr. Ruskin, "may be taken as absolutely right by the student." We have perfect beauty, then, as in the Milo; and, as with her too, it is not awe, but rather a friendliness towards the artist, confidence in his utter truthfulness, that suggests itself to the spectator. — Lastly, we experience the sublimity that is compounded of the sentiments of power and beauty when we look down from a mountain-top upon a landscape that shows the marks of man's dominion over nature, or when we ride a stormy sea in a stout ship, or when we read of heroic deeds and feel a personal elevation that reflects their heroism.

Is æsthetics of practical value?

§ 100. **The Practical Utility of Æsthetics.** — At first sight, nothing appears to be more useless, a greater mental superfluity, than the æsthetic sentiment. People of æsthetic temperament enjoy certain things more than others do; but they suffer more, also, and their enjoyment does not seem to bring them any practical advantage. What is it, then, that has kept the æsthetic sentiment alive? Why has it not simply died out, — disappearing as, *e.g.*, the power to move the ears has disappeared?

Perhaps we should not assume that the sentiment *is* useless. Movement of the ears was useful once: we see that it is so still to some animals. Æsthetics too, then, may have been useful once. And indeed, the very fact that it has not died out, while ear-movement has, should make us hesitate to take its uselessness as a matter of course. Let us look at its development historically.

Primitive art.

In primitive times, the body was decorated with a view to attracting a mate. Just as the male bird comes out in gorgeous plumage in the pairing season, so the savage decked himself with ochre and shells and feathers to make his person attractive. Then, by slow degrees, decoration travelled from person to surroundings: first, from the body to the clothes, and then again from clothes to house. But as the primitive house is a rude structure, and its owner poor, not much can be done by way of individual house-adornment; and so we find the members of a tribe clubbing together, so to speak, to decorate the common house, the temple. Æsthetics now enters into the service of religion.

The art of civilisation.

Again: as the tribes settled down to agricultural pursuits, man became a labourer; systematic and regular work grew to be a necessity. But work means play; if we labour, we must have recreation. What games, though, shall grown-up people play? They have lost their pleasure in children's games. Æsthetics comes to the rescue: art is the play, the proper recreation, of grown-up workers. We speak, and rightly speak, of the 'plays' of Shakespeare, and of 'playing' the violin. Æsthetics has now lost its religious meaning, and has been turned to secular purposes, — purposes of the very highest utility.

In no less than three ways, then, has the æsthetic sentiment proved itself of practical importance. It has been useful in courtship; it has been useful as enhancing the impressiveness of religious ceremonies; it is still eminently useful as the play of adults.

Æsthetics as play.

It may seem strange that a form of judgment, *i.e.*, of effortful attention, should serve as recreation. Æsthetics would appear to be rather a kind of work than of play. But we must remember (1) that primitive æsthetic judgments were inseparably connected with social and religious judgments, and that these latter judgments *had* to be passed; men were *forced* to take thought of their neighbours and to propitiate their gods. Hence the æsthetic attitude became a natural one at a very early stage of human development, and is a traditional 'of course' attitude with ourselves. And (2) we know that that play is most effectual, most recreative, which consists in a less serious copy of work. By repeating our work in lighter form, we get the maximum of refreshment with the minimum of mental wrench. Hence for the intellectual man, the man whose work is the work of judging, æsthetics, judging in play, is the very best sort of holiday-taking.

Moreover, the æsthetic sentiment, like all the sentiments, is liable to lapse into emotion, and the æsthetic judgment to lapse into a simultaneous association of ideas. We can enjoy now as the result of past judgments: the hearing of *Tannhäuser*, the sight of a Velasquez or of the Venus of Milo, may give us a perfectly effortless pleasure. Indeed, art owes a good deal of its vogue in modern times to the fact that we have, up to a certain extent, an inherited capacity for enjoying it without judging it at all. A symphony can be enjoyed only after judgment passed; but a waltz takes possession of us at once. Paderewski's playing can be appreciated only by a few: but thousands will pay large prices to 'see his fingers move,' just as they will to see trapeze-work at a circus. All this, of course, helps to keep art alive, — gives it a real usefulness, if not that higher usefulness which it has for those who use it aright.

Questions and Exercises

(1) Can you name any moods that correspond to the social sentiments mentioned in § 98? Describe a typical situation in which each of the sentiments of the list might arise.

(2) Give six instances of ugliness — three of ugly sights and three of ugly sounds — from your usual surroundings. Why are they ugly?

(3) Have some argumentative passage (§ 100 of this book, *e.g.*) read aloud to you. Notice how the intellectual sentiments arise and disappear, as the argument proceeds. Write out the names of the sentiments that you feel, and mark the sentences which call them forth.

(4) Compare the list of intellectual sentiments with the list of emotions given in §§ 63 and 64. Pick out the emotion into which each of the sentiments might pass, if active attention lapsed into passive.

(5) Draw two series of crosses, varying (1) the length of the cross-bar, and (2) its position upon the stem of the cross. Lay the series in turn before a class, and let each member pick out the most pleasing cross. See how closely the chosen proportions approach those of the golden section or of symmetry. — Are there any objects in constant use whose proportions seem to have been arbitrarily decided, but which when measured give the proportion 5 : 8?

(6) Can you recall any characters, in history or fiction, who might stand as embodiments of some social or religious sentiment?

(7) Why does a man cough, when embarrassed; and rub his eyes, pass his hand over his forehead, or scratch his head, when perplexed? Name some of the other characteristic expressions of sentiment.

(8) How does 'curiosity' differ from 'inquisitiveness'?

(9) It is said above that æsthetics 'has been' useful in courtship and religion. Is it still useful in either? If so, how does its present differ from its primitive usefulness?

(10) Matthew Arnold defined poetry as "criticism of life." Does this definition suggest any further field of usefulness for æsthetics? May æsthetics be properly extended to cover it?

(11) If my artistic sentiments have once become emotions, how am I to rise to new activity, — to move forward to new sentiments on the basis of my emotion material?

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CHAPTER XIII

THE COMPLEX FORMS OF ACTION

§ 101. **The Development of Action beyond the Impulse.** — The most complicated action that we discussed in Chapter IX. was the full-formed *impulsive* action, — an action whose motive, given in the state of passive attention, contained the idea of own movement, the perception or idea of the object moved to or from, and the idea of the result of movement. We have now to see what actions are performed in the states of active and of secondary passive attention.

Action with passive and active attention.

Active attention occurs when there are at one and the same time two or more claimants for the foremost place in consciousness (§ 32). One idea fits in with one aspect of the mental constitution or disposition of the moment, and another with another; one excitation runs into certain open tendency-channels, and another into others. There is thus a conflict of excitations in the cortex, and a conflict of ideas in consciousness. We have a see-saw of attention for a while, and then, at last, some one of the contestants wins the day.

Selective action.

The conflicting processes need not be ideas: they may be perceptions or assimilations or groups of ideas of any degree of complexity. Suppose, now, that we have at the same time two rival *impulses*, two impulses which cannot both be acted out because their movements are antagonistic. There will be a conflict, an effortful see-saw of attention, until the one or the other wins. Action which is motived in this way is termed *selective* action.

Volitional action.

Suppose, again, that the claimants for the attention are one of them an impulse and one of them an idea (or group of ideas) that has never formed part of a motive, that does not 'prompt to action' at all. In this case, too, there may be a conflict: we may move, or we may remain inactive and attend to the second claimant. If we move, we perform what is called a *volitional* action.

Selective and volitional actions are the highest, the most complex, that we know; they are the only forms that appear in the state of active attention. Both alike are simplified by the lapse of active into secondary passive attention. And the simplification that they undergo is merely a repetition of the simplification of the impulse itself. We have, first, the change into *psychomotor* action, and then a final descent into secondary reflex or (as it is better named) *automatic* movement.

Secondary psychomotor action.

Automatic movement.

It is with these four types that we are concerned, therefore, in the present Chapter.

The conflict of impulses.

§ 102. **Selective Action.** — Selective action has its root in alternating impulsive actions. When a young child suddenly comes face to face with a strange dog, the impulse towards (*cf.* the instinct of inquisitiveness) and the impulse away from (*cf.* the instinctive fear of the unknown) are realised in quick succession. The child goes up to the dog, runs back to its father, approaches the dog again, and so on. Later in life, when *active* attention has become a permanent feature of mental constitution, there is but one movement: the conflict of impulses is outwardly manifested only in the slowness with which movement follows upon the presentation of the motive, and (perhaps) in a puzzled and perplexed expression of face. In other words, we have in the conduct of adults selective action, and not alternate impulsive actions.

Sometimes, however, the alternation of impulsive actions takes place even in adult life. Thus it has happened to the author, in face of the two impulses (1) to shut a door on the right hand and (2) to seat himself at his typewriter-table on the left, actually to begin a right-hand movement towards the door, and then all at once to slue round to the typewriter, without having closed it. — In his story of "Dite Deuchars" Mr. Barrie has drawn a vivid picture of conduct permanently arrested at this half-way house between impulsive and selective action.

Complex impulses. The impulses whose conflict ends in selective action may, however, be very much more complex than the impulses which we have described hitherto. We have assumed that the 'object' of the impulse is quite simple; something that can be grasped by a perception or idea or assimilation. Suppose that the object is a situation, of the kind that gives rise to emotion, — that the impulse consists of idea of own movement, of ideas of a situation (idea of object), and of idea of result of movement: the consciousness that is made up of rival impulses will then be a very complicated affair. And again: suppose that the 'object' of the impulse is a situation of the kind that gives rise not to an emotion, but to a sentiment, a situation that has to be dissected by active attention before it can be grasped as a whole: consciousness

The most complex type of selective action.

becomes still more complicated. We are actively attentive to a mass of ideas, parts of which (the situations) themselves demand active attention if they are to be adequately met. In such a case, selective action is a most momentous matter; the drain upon the organism's strength is very great, and the choice exceedingly fatiguing. This is selective action at its highest point of development. It is rarely performed.

The reader will remember what we said in § 90 of the rarity of judgment, and of the facility with which we all of us take judgments 'on trust' from those who have already done the work of thinking. Remembering this, he will understand how tangled a set of processes the various forms of selective action are, and how difficult it is, in any given instance, to say whether active attention has been involved or not. Thus many choices in the sphere of *moral* conduct, which wear the look of extremely complex selective actions, may have resulted in actual fact from the conflict of simple impulses. Take the case of a rivalry of duties; of impulses, *i.e.*, whose objects are duty-performances. We do not know what to do; but still we choose, very often, without thought. "I shall feel better if I do *that*," we say, and do it almost offhand. Now if we had acted selectively, as we appear to have done, we should (1) have analysed the situation that called for the doing of the one duty, (2) have dissected that which demanded the doing of the second duty and (3) have weighed the two resulting judgment-impulses against each other, — all in the state of active attention.

The selective action of daily life.

The simplification, as always, has its good side. There are times when we *must* strain our active attention to the utmost; and the more lightly we take the clash of situations in lesser matters, the more energy we have left for the great occasions. If we refused to accept our neighbours' experience, and insisted on judging for ourselves, we should probably be too tired to act efficiently when the call came for really selective action. It is also true, in many cases, that the 'right' action is the action which realises the impulse that is strongest at the moment when the alternatives are suggested, and which is therefore, so to say, an instinctive action. If we scrupulously weigh consequences, and consider all the pros and cons, we are liable to lose our moral balance, to cut ourselves adrift from the moral anchorage of social tradition and public opinion, and so to act against our 'better nature.'

Any biography that goes at all minutely into details furnishes examples of selective action. Thus when Napoleon was free to turn his thoughts to England, after the treaty of Schönbrunn (1809), he found two possibilities of action: he might himself take in hand the conduct of the war in Spain, or he might devote himself to heightening the rigour of the blockade in the north and northwest. He chose the latter course. Again: when war with Russia became inevitable (1811), he deliberated whether to restore Poland and begin a campaign upon the Lithuanian frontier, or to strike a sudden and decisive blow by invasion with an overwhelming force. The latter course was chosen.—A carefully played game of chess will afford several such instances on a small scale.

The conflict of impulse and idea.

§ 103. **Volitional Action.** — Volitional differs from selective action merely in the fact that the conflict is carried on, not between impulse and impulse, but between an impulse and an idea (or group of ideas) which does not contain any inducement to action. I am reading a novel, when the thought strikes me that I ought to be working: the impulse to rise from my chair and set about writing comes into conflict with the passive interest of the story. My rising, if it takes place, is a volitional action.

Instance of volitional action.

Volitional action is subject to the same degeneration that we have just traced out in the case of selective action. Suppose, *e.g.*, — to quote a much-discussed instance, — that a well-to-do citizen, a man holding municipal office, the father of a family, the administrator of important trusts, is walking by a river-side, and sees a child fall from a wharf into the water. He has the impulse to jump in after it. On the other side are ranged the ideas of the seriousness of a wetting and the certainty of influenza to follow, the thought that his life is worth something to the community while the child has not yet proved itself honest or capable, the remembrance of duties owed to wife and children, etc. If all these considerations are reviewed, it is highly probable that no action will follow. In most cases, however, the jump is taken, and taken impulsively. Society praises the bravery of the act, and accounts it as volitional: and, indeed, it wears all the appearance of a volitional action. Nevertheless, there was no conflict, or at most a very weak one. Nature has seen to it that the men who inspire trust are the men who perform actions of this sort 'instinctively'; for nature looks to the good of the whole; and the keeping alive by example of the spirit of self-sacrificing courage is more for the good of the whole than the loss of a single member of society, however valuable, is for its harm.

So it may be in the simpler case given above. I may rise and begin to write without realising that the struggle has fairly begun. The novel was less interesting than usual for an instant; my attention flagged, and was seized by the idea of working; and here I am, with my pen travelling over the paper. There can be no doubt that many volitional acts, so called, are really impulsive. Nevertheless, there are times, as every reader must be able to assert from his own experience, when true volitional action is required of each one of us.

We have a typical instance of volitional action in the crossing of the Rubicon, *i.e.*, the invasion of Italy, by Julius Cæsar (B.C. 49). The alternative to this step was the passive resignation of the two Gauls and the dismissal of the army.

Shakespeare pictures volitional action, *e.g.*, in Juliet's drinking of the potion prepared by Friar Laurence (*Romeo and Juliet*, Act iv., sc. 3). Juliet deliberates:

> "What if this mixture do not work at all? . . .
> What if it be a poison? . . .
> How if, when I am laid into the tomb,
> I wake before the time? . . ."

and so on; but finally drinks. — *Cf.* Desdemona's resolve to follow her husband rather than stay with her father (*Othello*, Act i., sc. 3).

§ 104. **Choice and Resolve.** — Selective and volitional action are characterised, we said, by the *slowness* with which movement follows the formation of a motive. The period of inaction which intervenes between thought of action and action itself has received different names, according as the conflict of ideas goes on in the state of active or in that of passive attention. If we have a merely passive alternation of motives (as in the case of the child in presence of the dog; or in cases where the rival impulses are more complicated, but still do not require to be actively dissected, — where the situations that stand for the object-ideas are such as to call forth emotions only, not an oscillatory sentiment), we speak of a period of *hesitation*. If we have an active weighing of motives, as happens when the situations of the impulses are too complex to be passively apprehended, we speak of a period of *deliberation*. Hesitation is accompanied by the mood of uneasiness or depression or dissatisfaction; perhaps even by the emotion of melancholy or care. Deliberation is attended by the sentiment of obscurity, confusion, doubt, etc.

Hesitation.

Deliberation

Choice and resolve.

Deliberation, then, is the series of judgments or of active imagings that precedes selective and volitional action. But before movement can take place, deliberation must have been replaced by something else; conflict must have been changed into victory for the one side and defeat for the other. The emergence of the victorious judgment is termed *choice* in the case of selective and *resolve* or decision in the case of volitional action.

The appearance of choice or resolve, since it means that the conflict is over, means that active has lapsed into secondary passive attention. But this does not necessarily mean that *thought* has ceased. Since the victorious judgment is a *judgment*, we may still be actively thinking, after we have chosen or decided. Hence the end of deliberation may be accompanied by a sentiment (belief, ease, justice, compassion, etc.). More often, however, the judgment has become so familiar that active thought is not required: we have the emotion of relief or disappointment. — Further, to make the complication still worse, the fact of choice or resolve may itself become the topic of judgment: we may be proud, ashamed, etc., just because we have chosen or decided.

An instance may help to make the argument clear. Suppose that, after doubting whether to include an account of certain facts in this book or to leave it out, I decide to include it. My writing it down is a volitional action. What are the processes that constitute its mental antecedents?

Instance of choice with active attention.

(1) I have two conflicting situations before me: the put-in and the leave-out situations. Both are thought-situations, and each requires active attention; there are many arguments on either side.

(2) I deliberate: that is, I attend actively to both situations, with the sentiment of doubt. This means much effort.

(3) I decide: the effort of deliberation ceases, and the put-in judgment wins. At this point I may experience simply the emotion of relief; but, on the other hand, I may have the sentiment of agreement or truth that belongs to

the judgment as a judgment. If the put-in judgment was thoroughly familiar when I began to deliberate, the sentiment will not arise: if it was not, the situation may demand further thought.

(4) The process may stop here, or may continue. Let us suppose that it continues. I may think that it was foolish of me to spend so much time and trouble in deliberating, or that my deliberation showed that I was underestimating the reader's capacity; in that case I am ashamed. Or I may think that I need not have worried, for I have thought out the subject so completely, and made it fit in so well with what comes before and after it, that every one can understand it: in that case I have the sentiment of pride or of æsthetic fitness.

Not till all these processes have run their course does the actual writing begin. Four times over I have had to *think:* first, about each of the situations; secondly, about both of them together; thirdly, about the situation decided upon; and fourthly, about my own decision. Notice that all these processes may equally well be present when there is no action whatever. If, *e.g.*, I decide to leave out the account, (1), (2) and (3) will still necessarily be there, and (4) may occur also.

The choice of everyday life.

A very common form of *choice* is that pictured by Tennyson in "Œnonè." Paris is to give the golden apple to the fairest of the three chief goddesses. Herè comes first, making "proffer of royal power." Paris, moved by the single impulse,

> "held the costly fruit
> Out at arm's length, so much the thought of power
> Flatter'd his spirit";

but, before the action was performed, Pallas had intervened with the promise of wisdom. There is a conflict of impulses:

> "she ceased,
> And Paris pondered."

His deliberation is interrupted by Aphroditè's offer of

> "The fairest and most loving wife in Greece";

and this motive, forming just as the other two have been weakened by mutual struggle, carries the day.

The taking of a *resolve* is portrayed in the opening scenes of *Macbeth*. Beginning in the "suggestion whose horrid image doth unfix the hair," it culminates in the words:

> "I am settled, and bend up
> Each corporal agent to this terrible feat."

Will. § 105. **The Freedom of the Will.** — The psychology of attention and action is often termed the psychology of the Will: just as that of affection, feeling, emotion and sentiment is termed the psychology of Feeling, and that of sensation, perception, idea, association and thought the psychology of Intellect. Now one of the most debated questions in philosophy is that of the 'freedom of the will.' It is evident that we cannot answer a philosophical question by appeal to our own single science: answers must be obtained from ethics and logic and the other philosophical sciences, as well as from psychology, and the whole list of answers compared and summed up. But as there is a psychology of will, as psychology is *one* of the sciences appealed to by those who discuss this question, it will be well for us to ask here what psychology has to say upon the matter.

The psychological arguments for freedom

The psychological arguments in favour of the freedom of the will are two. In the first place, it is said, we choose and decide even when the rival groups of ideas are of equal strength, when the two conflicting situations are equally attractive or equally repulsive. This shows that the mind is free to choose or resolve as it pleases. Secondly, after we have chosen or decided, we are confident that we might have chosen differently; a reëxamination of the motives shows that there was nothing in them that could force or compel us to choose as we did. But if the motive upon which we acted did not compel us to act, the mind must itself have added to the power of that motive, must have turned freely to the one situation rather than to the other.

and their rebuttal.

There are, however, two criticisms to be made upon these arguments. (1) They both speak of the mind as if it were a living, acting creature. That is the popular view of mind: but we have given it up for the scientific view, which is that mind is a stream of mental processes (§ 4). It is natural, perhaps, to think of a mind-creature as choosing freely; it is very difficult to think of a stream of processes as making a choice. Yet this is what we should be obliged to think, if the arguments held. But they do not hold: for (2) they both assume that the conscious motives to action are the sole conditions of action. Now this is a wholly unwarrantable assumption: the arguments have missed the fact that bodily tendency, natural and acquired, — the trend of the whole nervous system, to which *no* conscious process corresponds, — helps the conscious motives to determine action. The tendency-channels in which some cortical excitations run are deep and well-worn; those which others find open are shallow and difficult. Naturally, then, the motives that correspond to excitations of the former sort gain the victory over their rivals of the latter sort (§ 32). While there is all the appearance of fair play, nature is working behind the scenes, favouring the one contestant and hindering the other.

As psychologists, therefore, we cannot accept the freedom of the will unless (1) we throw away our scientific definition of mind, and return to the popular notions held about it. And further, (2) as psychologists we are able to explain, by means of nervous tendencies, certain phenomena of choice which are commonly supposed to furnish a basis for the belief in freedom. On the other hand, we must always remember that psychology is not the sole judge of the question.

Secondary psychomotor action.

§ 106. **Psychomotor Action and Automatic Movement.** —The psychomotor action that we have now to discuss is derived from selective or volitional action. Some particular impulse is habitually victorious in the conflict of deliberation, and gradually degenerates as the result of victory. Hence this psychomotor action differs from that of § 71 in two circumstances. In the first place, it is of higher parentage: the impulsive action from which it descends is an action whose motive is of the complex kind described in § 102, — an impulse in which the object-perception is replaced by an object-situation. Secondly, this complex impulse is not one of the universal animal impulses, such as food-taking, but an impulse which has been put together in the course of a single lifetime. In origin, then, and in matter, there is a difference; in all other respects the actions are identical.

Instance.

An extremely good instance of this secondary sensorimotor action is to be found in the playing of a skilled pianist. When we are learning to play the piano, our actions are one and all selective; we have to think which dot upon the score stands for which note upon the keyboard, and which finger is to be set down where. As we become adepts, the reading of the score becomes more and more mechanical; until at last, if we are skilful players, the bare sight of the printed sheet 'touches off' the movements of hands and feet; we fall instinctively into the right key, the right time, the right emphasis, etc. We may even carry on a conversation, and still play correctly, though we have never seen the score before.—Speaking from internal initiative is an instance of secondary ideomotor action.

The automatic movement differs from the reflex (§ 72) in the same two ways. It is the final degeneration-product of selective or volitional, not of simple impulsive action; and its mechanism is not inherited, but acquired during the individual life. This latter fact means, of course, that it is less stable than the reflex. It is a reflex movement while it lasts; but it may be forgotten, the habit of it may be broken up. **Automatic or secondary reflex movement.**

A man who writes much at a particular desk will dip his pen in the ink-bottle quite automatically, reflexly. He does not need to gauge the distance or direction or the depth of dip; his eyes are not raised from the paper, and his attention does not slip for a moment from the subject in hand. So one may be able to write quickly and accurately with a typewriter, without having any certain idea at all of the position of the various letters: the striking here or there becomes entirely automatic. **Instances.**

Nevertheless, if the writing be given up for a time, the movement must be relearned: the pen is guided to the ink-bottle by the eye, and the typewriter strokes are practised anew. On the other hand, a real reflex never lapses; a feather applied to the sole of your foot makes the foot jerk up, however long the interval since the last tickling.

Swimming and walking seem to stand half-way between the automatic and the reflex movements. Both are learned with care and effort; neither, it would appear, is ever quite forgotten. The reason is that though we do not inherit the mechanism of the movements ready-made, we inherit strong tendencies or dispositions towards them.

For automatic movements *cf. H.*, 301; *F.*, 739, 779. For the bodily machinery of the complex movement in general *cf. F.*, 729 ff., 739 ff.

§ 107. **The Classification of Action.** — It will, perhaps, assist the reader to grasp the mutual relations of the various forms of action and movement, to see the motor side of mind, so to speak, in its right perspective, if we give a complete Table here in the shape of a genealogical tree.

The forms of action.

Primitive Action
(Movement of whole body on attention: § 68)

SIMPLE IMPULSIVE ACTION
(Idea of own movement, Perception of Object, Idea of result: §§ 69, 70)

Psychomotor Action (§ 71)	Instinctive Movement (§ 73)	Complex Impulsive Action (Idea of own movement, Perception of emotion-situation, Idea of result: § 102)	Complex Impulsive Action (Idea of own movement, Perception of sentiment-situation, Idea of result: § 102)
Reflex Movement (§ 72)	Instinctive Action (§ 73)	Selective Action (§ 102)	Volitional Action (§ 103)
Mechanical Movement (of blood, intestines, etc.: § 72)			

[Secondary] Psychomotor Action (§ 106)

Automatic Movement (§ 106).

§ 108. **The Compound Reaction.** — Taking the sensorial form of the simple reaction as our starting-point, we can build up, for introspective examination, artificial selective and volitional actions, and can trace experimentally their passage into psychomotor actions and automatic movements.

Two kinds of compound reaction.

But we cannot pass from the sensorial reaction to the 'choice reaction,' as it is called, at one step. For there are two obvious differences between impulsive and selective action. In the former, the action-consciousness contains *one* idea of movement and *one* perception (or idea) of object. In the latter, there are at least *two* ideas of movement, and at least *two* perceptions (or ideas) of object. Otherwise, of course, there could be no conflict of impulses. — If we are to have an artificial selective action, then, there must be a *number* of stimuli presented by the experimenter, and a *number* of responsive movements agreed upon between him and the subject. But it would be bad policy to introduce both of these complications at the same time. On the one hand, the subject would be confused; on the other, we should not know what the total reaction-time meant. Much of it might represent processes that were very different from the process of choice which we desire to measure and introspect.

To avoid this difficulty, we first of all make reaction-experiments in which there are two or more stimuli, but only one answering movement. That done, we proceed to the more difficult experiments, in which every stimulus has its own particular movement of response. The subject thus has opportunity to observe the simpler forms of the action-consciousness, in ascending order, before he grapples with its most complex and most highly developed form.

What is said here of the artificial selective action holds also, *mutatis mutandis*, of the artificial volitional action. This will become clear from a consideration of the actual experiments.

Discrimination and cognition reactions.

I. *Experiments with a Number of Stimuli and One Movement.* — Two forms of the reaction-experiment fall under this head.

1. *The Discrimination Reaction.* — In the simple sensorial reaction, the subject moves when he has apperceived a familiar stimulus, a sound or pressure which has become known to him by previous practice. In the discrimination reaction, he moves when he has apperceived some one of two or more familiar stimuli. He may be told, *e.g.*, that he will hear either the tone or the noise with which his simple reactions have familiarised him; but he does not know which of the two stimuli will be presented in any particular experiment.

This reaction plainly stands at a higher level than the sensorial simple reaction. The subject comes to the work in the state of active attention; his mood is that of intellectual obscurity (§ 97). When the stimulus appears, obscurity becomes agreement or contradiction, according as his expectation has tended in the right or the wrong direction. As soon as the sentiment has been resolved upon the at-home mood of recognition, and before the stimulus has called up associated ideas, verbal or other, the reaction-movement is made.

2. *The Cognition Reaction.* — This differs from the discrimination reaction in the fact that the stimuli are known to the subject only in a vague and general way. Thus he may be told that he will hear a musical sound, and that he is to move when he has apperceived it; but he is not told (what the experimenter has decided) that the sound will be given upon some one of the three instruments, piano, violin and whistle.

Here the strain of active attention is greater than before; the mood of recognition takes shape more slowly; and it is very difficult to move before associated ideas crop up, — to keep to the rule of the experiment, and prevent the reaction from becoming an association reaction (§ 76).

The following are some of the times of cognition reactions:

Colour stimuli	.300 sec.;
Printed letters	.320 sec.;
Short words (printed) . . .	.320 sec.

The times of discrimination reactions are slightly less than the corresponding cognition times.

Choice reactions.

II. *Experiments with a Number of Stimuli, each of which is correlated either with a Specific Movement or with the Absence of Movement.* — All these reactions are termed 'choice reactions.' The choice reaction may be either an artificial selective or an artificial volitional action. Moreover, it may be based either upon the discrimination or upon the cognition reaction. Hence we have four experimental forms to consider.

1. The Choice Reaction as *Selective* Action.

a. The Discrimination Type. — The reactor is told, *e.g.*, that he will hear either the familiar noise or the familiar tone; and that he is to react to the former by a movement of the right, to the latter by a movement of the left hand.

b. The Cognition Type. — The reactor is told that he will hear a musical sound, and that he is to react to what comes by *naming* it, by uttering aloud the name of the instrument which gives it. The movement is here a movement of the muscles of the larynx, etc., not a movement of the hand.

2. The Choice Reaction as *Volitional* Action.

a. The Discrimination Type. — The subject is told that he will hear either the familiar noise or the familiar tone, and that he is to reply to the former by a movement of the right hand, but not to reply to the latter by any movement.

b. The Cognition Type. — The subject is told that he will hear either a musical or an unmusical sound, and that he is to react to the former by naming the instrument which gives it, but not to react to the latter at all.

It is clear that we have, in these four instances, cases of true selective and true volitional action. The reaction-times are, naturally, longer than those of the discrimination and cognition reactions. Volitional action requires, upon the whole, a slightly less time than selective action.

Automatic reactions.

3. *The Automatic Reaction.* — If the conditions of the choice reaction are kept sufficiently simple, and if the subject is held in steady practice for a long period of time, we get the first form of what is called the 'automatic' reaction, an artificial *sensorimotor* action (*cf.* § 76). If, *e.g.*, the stimuli are but two in number, and as different from each other as a tuning-fork tone and a rap upon a wooden block; and if the movements of response are made by the forefingers of the two hands; then the whole experiment may quite well become 'automatic' in the course of an investigation which demands daily work for some months together. Should practice be continued still further, the sensorimotor action may degenerate into true *automatic* or secondary reflex movement: this happens more readily with the selective than with the volitional reaction. At each stage of the descent, the reaction-time undergoes a marked shortening.

All these forms of the reaction-experiment are important. They enable us to introspect complex motives under standard conditions, and to trace the degeneration of the highest types of action into lower types.

Questions and Exercises

1. *The Compound Reaction.* — By help of the side wire, all the compound reactions may be taken (in visual form) upon Professor Sanford's reaction-timer.

   1. 1 *The Discrimination Reaction.* — Use three known stimuli: black, white and grey, or red, yellow and

blue. Vary the stimulus from experiment to experiment. Then repeat the experiments with four, five, etc., known stimuli.

I. 2. *The Cognition Reaction.* — Prepare a series of some twenty colours, and one of five brightnesses (from black to white, inclusive). Tell the subject that he will see 'a colour' or 'a brightness quality.'

For both these forms of the reaction-experiment, printed letters (small letters and capitals) and words of three or four letters may be used in place of the colours and brightnesses. Choose a heavy-faced type, with no flourishes to the letters. Mount the letters and words separately, upon small pieces of white cardboard.

II. 1. *a. Selective Discrimination.* — Take five known brightnesses, and let the subject react to each by the movement of a particular finger of the right hand. In this experiment the reacting hand is not placed upon the upper key before the experiment begins, but lies upon the table, close beside the instrument. Record the mistaken movements, as well as the correct reactions. Note the influence of practice in eliminating mistakes. — Or take ten known colours, and assign a particular colour to each of the ten fingers. In this case, the subject's two hands lie upon the table, at equal distances from the key.

II. 1. *b. Selective Cognition.* — Tell the subject that he will see 'a colour.' Let him place his finger on the key before the experiment begins. He must *name* the stimulus, and press his key down at the moment that he utters the word.

II. 2. *a. Volitional Discrimination.* — Tell the subject that he will see either some one of five known colours or a neutral grey. He is to respond to the colours by moving the appropriate finger of the right hand (which lies upon the table); he is not to move at all in response to the grey. Record (1) the finger mistakes (use of second for third finger, etc.) and (2) the incorrect reactions (movements made in response to grey). Note the influence of practice.

II. 2. *b. Volitional Cognition.* — Tell the subject that he will see either a colour or a neutral grey. He is to react to the colours by naming them (pressing the key as he speaks); he is not to react to the grey.

III. 1. *Psychomotor Action.* — Take two known stimuli, black and white. White is to be answered by movement of the right, black by movement of the left hand. Let the subject repeat 'white — right, black — left,' until the connection of ideas is firmly established. Continue practice until the selective discrimination becomes sensorimotor action.

III. 2. *Automatic Movement.* — Continue practice of III. 1 still further. Engage the subject in conversation during an experimental series, and note that he is able to react correctly while his attention is diverted from the experiment.

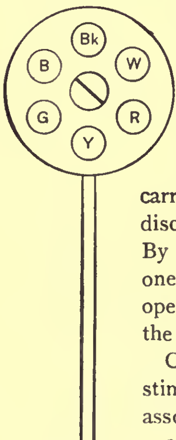

FIG. 18

Fig. 18 shows a special form of the side wire, for use in compound reactions. The upper end carries a large metal disc, upon which six stimulus-discs of different colour or brightness can be placed. By turning the milled edge of the metal disc any one of the six stimuli can be brought behind the opening of the black screen. A spring catch at the back holds the disc in the required position.

Certain forms of compound reaction to auditory stimulus can be carried out on the pattern of the association reaction to spoken words (p. 185).

2. We spoke in § 76 as if the association reaction were based directly upon the simple sensorial reaction. Is this strictly correct?

3. Give instances, from history and fiction, (1) of selective action, (2) of volitional action and (3) of conflicts of ideas from which volitional action might have resulted, but did not, — *i.e.*, of cases in which the no-movement ideas were stronger than the impulse to action.

4. Can you illustrate the statement of § 102 that 'instinctive' selection is sometimes a better guide to conduct than 'deliberative' selection?
5. Name some of the automatic movements most commonly acquired by civilised man.
6. What is 'desire'? How does it differ from impulse?
7. On p. 255 it is said that 'Nature is working behind the scenes.' Can you translate this figure into scientific terms?

References

James, *Textbook*, pp. 124–126, ch. xxiii.
Sully, *Human Mind*, vol. II., ch. xviii.
Titchener, *Outline*, §§ 68, 69, 94–97.
Wundt, *Lectures*, Lects. XV., XXIX.
Wundt, *Outlines*, § 14.

CHAPTER XIV

Abnormal Psychology

Sleep. § 109. **Sleep and Dreams.** — The series of waking consciousnesses (§ 17) is interrupted, at fairly regular intervals, by a period of *sleep*. From the physiological side, sleep is a rest or recuperation of the whole body, and more especially of the nervous system and its attachments (sense-organs and muscles). In profound sleep the brain is comparatively bloodless, and therefore inactive. No impressions make their way inwards, through the channels of sense, from the external world; no excitations are sent outward to the muscles. The muscular system is relaxed, and the position that the body assumes is simply a matter of the relative weight of its parts (*cf.* the discussion of drowsiness: § 25).

Dreaming. During sleep of this profound character, consciousness seems to lapse altogether: for the time being there is no mind; the bodily conditions of mental process are not realised. In the lighter stages of sleep, on the other hand, we *dream*. Mental processes appear, and consciousnesses are formed; the outside world finds access to the brain. Sometimes, though less often, we walk or talk in our sleep; excitations are sent out from the brain to the muscles. But the world of the dreamer and of the sleepwalker is not the real world of the waking life; their consciousness is abnormal, *i.e.*, is in a different *state* from the waking, attentive or inattentive consciousness. Dreaming has something in common both with attention and with inattention, but is different from either. We must find out, briefly, how dreams arise, and in what their difference from the waking consciousness consists.

§ 110. **The Origin and Composition of Dreams.** — It is generally thought that dreams arise 'inside the head,' as the result of some excitement of the brain itself. Recent experiments and observations have, however, made it practically certain that dreams are set up as perceptions are, by the stimulation of some sense-organ. After eye or ear or internal organ has been stimulated, the brain goes on working independently (law of habit, § 57); just as, in the waking life, a single perception may start a long train of ideas.

Dreams set up by external stimuli.

Since every sense-organ is liable to chance stimulation, it follows that dreams may be made of any kind of sense-material: we may dream in sights or in sounds, in strains or in temperatures. As a matter of fact, by far the greater number of dreams (whatever their stimulus may be) are visual dreams. The incoming excitations are translated into visual terms (§ 50). If the bodily condition of the dream is a stimulation of the temperature organs, we may see ourselves ascending Etna or sleighing across an ice-field; if it is a cramped position of the muscles, we see an army of crabs advancing to pinch us, or a swarm of bees settling to sting; if it is a taste, we see ourselves eating some delicious or disgusting food; and so on.

Dreams mostly visual.

Dream stimuli.

We take every precaution to avoid dreams: we go to sleep in a dark and quiet room, we rid ourselves of the friction of our clothes, we keep a constant temperature in the bedroom, we lie down, etc. Nevertheless, we cannot rule out the circulation of blood in the retina and the pressure of the lids upon the eyeballs, the thump of the pulse in the vessels of the ear, the slipping down of the bedclothes, the palpitation of the heart, the disturbances of indigestion, etc. Any one of these may serve as the condition of a dream.

Why dreams are visual.

The reason why the incoming excitations are so often translated into terms of sight is twofold. In the first place, the eye is extremely sensitive both to slight changes of light and to changes in the pressure of the eyelids, the state of circulation in the retina, etc.; and the sensations thus set up (sparks, flashes of colour) are reinforced by the cortical grey sensation (§ 17). If there were no subjective grey, the eye might have no advantage over the ear as a means of starting a dream; if the retina were not so sensitive, the subjective grey might lapse during sleep. The two things together — excitability of the sense-organ, and excitability of the cortex — favour the arousal of visual dreams. In the second place, we dream largely in terms of sight for the same reason that we remember and imagine largely in terms of sight; the eye is the most important of all the sense-organs, the organ most frequently used, and the organ most relied upon for knowledge of the outside world. Hence the visual centre of the cortex has multitudinous connections with all the other brain-centres, and is readily excited when any one of them is excited. — It may, of course, be questioned whether some dreams, actually experienced in other terms, are not translated into terms of sight in the waking consciousness, when they are recalled and reported.

§ 111. **The Characteristics of the Dream Consciousness.** — The two chief differences between the dreaming and the waking consciousness are (1) that the train of dream ideas is disorderly and fantastic in its arrangement, and (2) that in spite of this disorder the dream is taken for granted, and the reality of its incidents unquestioned. Both these facts call for explanation.

Fantastic arrangement of dream ideas.

(1) The fantastic arrangement of dream ideas is due to the irregular distribution and limitation of attention during sleep. Attention is selective; while one thing is attended to, others are attended from. But, in the sleeping cortex, the selection is made at hap-hazard; within very wide limits, every excitation has the same chances as every other. The organism is free, for a few hours, from the special bias and leaning (§ 32) given it by the routine of daily employment; there is as much likelihood of a play-channel being open as of a work-channel, of a childhood-channel as of a recently formed, professional channel. Only the oldest and most fundamental formations of consciousness — space perception, personal identity, etc. — remain throughout. So we have, in dreaming, an exaggeration of the flights and fancies of day-dreaming and reverie. The ideas that come up are all held together by association; but, since we are not attending to any particular topic, the range of association, the area of experience from which the ideas may arrive, is extraordinarily great.

Law of association in dreams.

Dreams, then, are not entirely disorderly. The law of association holds; the seeming disorder means simply that the range of associated ideas available for a consciousness is much larger than usual; and the range is larger, because no limit as to topic, period of time, etc., is set by attention. Nor are the bodily tendencies done away with: they are all there, in the cortex, so that no one of us could dream his neighbour's dreams. The difference is that, in the waking life, some tendencies are appealed to by daily business, by surroundings, etc., while others are left unrealised; whereas in the dream consciousness all the tendencies have the same prospect of realisation. There is nothing to guide the stream of processes, no environmental pressure upon the organism; an excitation is as likely to run into any one open channel as into any other.

Why dream events are taken for granted.

(2) Our unquestioning acceptance of dream events, an acceptance that we are puzzled to account for on waking, is due to two things. In the first place, we have in dreaming no means of testing or checking what happens. In the waking life we compare event with event; in the dream there is nothing to compare the train of ideas with. In dreaming, *e.g.*, the time is always present time; even if we are interviewing Alexander the Great, the interview is occurring *now*. Periods of time are foreshortened in the most arbitrary way: we have the occurrences of a whole day in a few seconds, very much as we do in a novel or a play. As there is no standard to refer to, there can be no question in the dreamer's mind as to the possibility or impossibility, the correctness or absurdity, of the dream scenes.

In the second place, dream ideas are exceedingly vivid and impressive; and this vividness helps to make us accept them. If you are aroused in the morning by a tapping at your door, and if (as may easily happen) the sounds set up a dream before they thoroughly awaken you, you dream of thunder or the roar of artillery or the crash of a falling house, and are astonished when you wake to find how slight the intensity of the noise really is. In this respect, the dream consciousness resembles (or rather counterfeits) the attentive consciousness of the waking life. One of the principal marks of the state of attention is the clearness and vividness of the idea attended to.

We take our dreams for granted, then, because we have nothing to compare them with, and because they are made up of clear and vivid ideas.

The physiological conditions of dreaming are but little understood. There must, apparently, be local and sporadic activity in the cortex, at the same time that there is general inactivity. The coördination of the cortex by means of the centre for touch and organic sensation (p. 225) is disturbed; the visual centre is in most cases more or less active.

The cortical conditions of dreaming.

The lack of cortical coördination means the lack of guidance of the train of ideas, *i.e.*, the absence of steady or sustained attention. The local and sporadic character of the excitement explains the fact that we have in dreaming no standard of comparison; the ideas come in single file, and are passively accepted as they come. It is not easy to account for the vividness of the ideas; perhaps the absence of background, of perspective, gives them a factitious value, — much as we take a fly close to the eye for a crow seen at a distance. Lastly, the reason that we do not habitually talk and walk when we dream must be sought in a blocking of the nerve-paths that lead from the sensory to the motor centres, or from these to the muscles. If we had, in the waking life, ideas that even approached the dream ideas in vividness, we should undoubtedly move; there would be ideomotor action. Hence the problem is, not why we sleep-walk, but why we do not.

§ 112. **Hypnotism.** — The word 'hypnotism' is the general name for a group of abnormal phenomena, bodily and mental, many of which bear a close external resemblance to the phenomena of sleep and sleep-walking. The symptoms of the hypnotic state differ, not inconsiderably, in different cases. In general, however, three stages or phases of hypnosis may be distinguished. They are as follows.

(1) *Preliminary Stage.* — The subject is heavy or drowsy. His behaviour is very like that of a man just aroused from sound sleep, and not yet 'come to himself.'

The three stages of hypnosis.

(2) *Light Hypnosis or Catalepsy.* — The subject is to some extent anæsthetic, insensitive; his sense-organs are closed to all the ordinary impressions from the outside world. At the same time, he hears what is said to him by the operator, and performs any action that he is commanded. He can do nothing without the word of command; so that he will maintain a position, however uncomfortable, until the order comes to relax it. On waking, he remembers cloudily what took place during hypnosis.

(3) *Profound Hypnosis or Somnambulism.* — The anæsthesia becomes more complete; and the subject not only acts but perceives at the bidding of the operator. On waking, he has no memory of what has taken place.

In the second stage, *e.g.*, the arm of a subject may be pricked with needles, and there will be no indication that either pressure or pain has been perceived; the skin is anæsthetic. Or the subject may be laid out at full length upon a row of chairs, and these all removed except the two that support head and heels. He will remain motionless, in this tense attitude, until released by the operator. In the third stage, he perceives whatever he is told to perceive: takes coal for sugar, ink for wine, tapping on the table for the playing of a violin, etc.

Hypnotic phenomena have attracted much attention, of late years, from psychologists and physicians. We have to-day a pretty complete understanding of them on the psychological side, though their full explanation will be impossible until our knowledge of brain physiology has advanced far beyond its present limits.

The word 'hypnotism' (Gk. *hypnos*, sleep) was coined by James Braid (1795–1860), an English surgeon who wrote much on hypnotic phenomena in the forties. Braid's books are still well worth consulting by the student of hypnosis.

§ 113. **The Conditions of Hypnosis.** — The question of the mental conditions of the hypnotic state falls into two part-questions: What makes one hypnotisable? and: How much has the operator to do with the production of the hypnotic state? We will consider them separately.

(1) The sole condition of hypnosis, in one's own mind, is an entirely rapt or absorbed attention to some particular person or thing. The depth of this attention surpasses that of any of the three phases of the normal attentive state (passive, active and secondary passive attention); there is a total 'surrender of the will,' as the popular phrase goes, to the person or thing attended to.

Hypnosis an extreme attention.

The hypnotic consciousness, then, resembles the dream consciousness in the fact that its ideas come singly, one after another; only one part of the cortex is in active function. Here, however, the resemblance ceases. In dreaming, there is fitful, scattered attention; in hypnosis, an exaggeratedly sustained and concentrated passive attention.

Fig. 19 shows the dream and hypnotic consciousnesses, after the pattern of Fig. 10. The stream of consciousness flows out of the paper, towards the reader. In *a*, the dream consciousness, we have a single narrow wave; the greater part of the bed of the stream is dry. The wave is nearly as high as the attention-wave in Fig. 10 *b*. Below we have the hypnotic consciousness; a state of extreme attention, with the level of the ideas attended from depressed almost to disappearance.

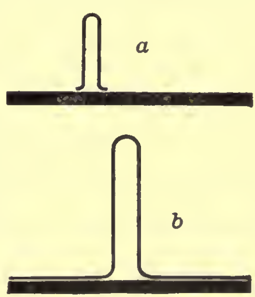

FIG. 19

(2) The 'influence' that the operator has over the subject is an influence given him *by* the subject. The condition of hypnosis lies in the subject, not in the personality of some other man. The operator has,

Hypnosis always self-hypnosis.

it is true, two advantages. He asserts emphatically that he 'can hypnotise'; and we all tend to believe an emphatic assertion, however groundless it may be. So we give him an influence over us, even before we have seen him. And the operator knows, from long experience with hypnotised subjects, how we shall most easily fall into the hypnotic state, how, *i.e.*, our complete attention can best be secured: whether by coaxing or by bullying, whether by strokings that suggest the gradual flow of a power from him or by a smart stroke on the back of the neck that confuses us for a moment, etc. All the 'methods' of hypnotising are so many tricks to bring about the state of rapt and absorbed attention in the subject's mind.

Three corollaries follow from this statement of the conditions of hypnosis.

(*a*) The presence of the operator is not required; one can hypnotise oneself. It is only necessary to close the channels of sense against the variety of outside impressions (by sitting in a dark room, listening steadily to a faint sound, etc.), and to attend fixedly to the idea that one will fall into the hypnotic state: hypnosis results. This process is termed self-suggestion or *autosuggestion*.

(*b*) Any normal person can be hypnotised, just as any normal person can dream. Only young children and idiots, who are 'scatter-brained,' incapable of concentrated attention, are also incapable of hypnotisation. People differ in liability to hypnosis, as they do in liability to dreaming; but the difference is merely one of degree.

(*c*) Animals could be hypnotised, if they could be brought for a moment into the state of extreme attention. Indeed, by thoroughly and suddenly frightening an animal, one can set up a state (known as *cataplexy*) which is, at least, very similar to the hypnotic state. Seize a frog unexpectedly by a hind leg, as a heron would seize it: instead of struggling to escape, the frog becomes rigid, and remains perfectly quiet.

§ 114. **Some Debated Questions of Hypnosis.** — There are four topics, much discussed in the literature of hypnotism, about which it may be well to say a few words here. They are rapport and suggestion, double consciousness, terminal suggestion and the therapeutic value of hypnosis.

(1) All the phenomena of hypnosis can be summed up in the single word *suggestion*. The operator suggests to the subject what he is to see and do; the subject suggests to himself that he shall enter the hypnotic state. We have already had instances of suggestion in the Exercises appended to Chapter II. (*cf.* § 88). **Suggestion**

Now it may easily happen, after the subject has acquired a general belief in the 'powers' of a particular operator, that he passes to a very special belief in these powers. He believes — either because the operator has 'suggested' it to him, or because he has 'suggested' it to himself — that no one but this operator can hypnotise him. It then follows, of course, that the required concentration of attention can be secured only when the operator is present. Thus arises the *rapport*, as it is called, between hypnotiser and hypnotised. **Rapport.**

In other words, the rapport consists in an insistent belief, in the subject's mind, that one and only one man can hypnotise him. There is nothing mysterious about it, any more than there would be about the contrary belief that a certain man could *not* hypnotise him. The rapport is often set up by physicians, with patients who are undergoing hypnotic treatment, to avoid interference in the case by other operators.

Double consciousness.

(2) We have seen that the subject who is aroused from the somnambulistic state has no memory of what has taken place during hypnosis. Oftentimes, however, memory is carried over from hypnosis to hypnosis; *i.e.*, the subject, when rehypnotised, remembers what he saw and did in the previous state of somnambulism. We thus have an alternation of memories: waking memory, hypnosis, waking memory continued, hypnotic memory continued, waking memory again, hypnotic memory again, and so on. This phenomenon has received the name of *double consciousness*, and has been explained by the hypothesis that there are two 'selves' to every body, a primary (waking) self and a secondary (trance) self.

The hypothesis is unnecessary. When we wake, whether from somnambulism or dreaming, we wake into a different world from that in which we have been; the functions of the cortex are altered; there is no reason why we should remember from the one state to the other. When we fall asleep again, or are rehypnotised, we go back into the unreal world; the cortex takes on its former functions once more; there is no reason why we should not remember from the one state to the other.

Everyone knows how easily dreams are forgotten on waking. And most readers have, probably, had the experience of a continuous dream, a dream that is continued from night to night. The reason that dreams are not more often continuous is that there is no regulation of the dream consciousness by attention; hence the course of the train of ideas may be deflected by the accidental stimulation of the moment.

The first time that the author 'took gas' for a dental operation, he had a vivid and detailed dream. He has taken gas on three subsequent occasions; and each time the same dream has been repeated and continued. The incidents of the first dream can be traced to certain experiences of the waking life: so that it would be absurd to speak, in this case, of a double consciousness. Yet the continuance of memory from somnambulism to somnambulism is precisely parallel.

Terminal suggestion.

(3) If the operator suggests to a subject in the somnambulistic state that he do something so long after waking, — *e.g.*, break a pane of glass at five o'clock, — the action is usually performed. Such a command is called a *terminal suggestion.*

The explanation is that the operator's suggestion of the *time* at which the action shall be done serves as a bridge between the hypnotic and the waking consciousnesses. The time-idea is common to both. Hence, when the time comes round, the subject relapses (by association) into the hypnotic state, and obeys the suggestion. In the case of double consciousness, just discussed, no bridge has been built by the operator between the real and the unreal worlds.

Hypnosis as a therapeutic agent.

(4) We come, lastly, to the question whether hypnosis can be employed as a curative agent in the treatment of disease. The answer seems to be that (*a*) derangements of circulation and secretion, and (*b*) habits like alcoholism, can be remedied and removed by hypnotic therapeutics. Just as a 'suggestion' will make us blush (circulation) or cry

(secretion) in the waking life, so will the stronger suggestion of the somnambulistic stage work greater changes in blood-supply and glandular action. And just as a sharp rebuke will keep a child from repeating an offence, so will suggestion restrain the drunkard and the morphine taker. On the other hand, (*c*) no amount of suggestion will cure typhoid fever or a broken leg; it is only functional disturbances that hypnosis can cope with. Nor is hypnotism of much use (*d*) as an anæsthetic; chloroform has stood the test of hospital practice far better. Finally, (*e*) even at the best there are grave dangers connected with the therapeutic employment of hypnosis. The patient is always liable to suffer relapse; in time, he may fall a prey to a 'hypnotic habit' as afflicting as the alcohol or morphine habit of which he has been cured; and it has been observed, in some instances, that the unhesitating acceptance of the physician's suggestion has led to an equally unhesitating acceptance of all statements, so that the patient loses power to distinguish between the probable and the improbable, and believes fables. — On the whole, then, it may be doubted whether the remedy is not as bad as the disease.

Mental pathology.

§ 115. **Insanity and its Conditions.** — There is a great difference between dreaming and hypnosis, on the one hand, and insanity, on the other, although all three sets of phenomena fall under the general heading of 'abnormal psychology.' Dreaming and hypnosis are abnormal states of a normal mind; they show a deviation from the rule or norm of function in a sound cortex. Insanity, on the other hand, is the sign of an unsound cortex, of a diseased or 'pathological' state of the brain. Hence while the discussion of dreams and hypnotism forms a sort of appendix to normal psychology, the discussion of insanity, in all its various modes, begins with the consideration of temporary disturbances of cortical action (dreaming, hypnosis, intoxication) and then runs parallel with the discussion of the normal mind: disorders of perception, of idea, of association, of emotion, of action, etc., are taken up in turn. It is clear from this that the subject is far too extensive for us to offer any adequate treatment of it here: the psychology of insanity, like child psychology and ethnic psychology (§§ 118, 120), requires a book to itself. We can do no more than note, in outline, the conditions of mental derangement and the typical forms which insanity assumes.

It is important to understand the difference between a pathological state, and a state of temporary deviation from the norm in an otherwise sound brain. We may say, perhaps, that dreaming and hypnosis stand to insanity as a sluggish liver stands to small-pox or a crushed foot; as occasional alcoholic intoxication, with its elevation of mind, thickness of speech and unsteady gait, stands to the maudlin besottedness and incapacity of the habitual drunkard; or as the tiredness of an athlete after severe exercise stands to the feeble inertness of old age. We shall, indeed, not be far wrong if, summing up in a single word, we describe the difference as that between a derangement of *function* and a derangement of *structure*.

Heredity and stress.

The conditions of insanity are usually stated to be of two kinds: *heredity* and *stress*. We may inherit a badly made brain, a brain loosely put together of unstable tissue. In that case, a very slight shock will destroy our mental balance. As Dr. Mercier says: "A jerry-built villa is liable to be blown down by a storm of wind, but nothing short of an earthquake will destroy a well-constructed mansion." On the other hand, we may inherit a fairly well made brain, but the storm and stress of life may prove too much for us: in this case, too, we lose our sanity.

It is clear that these two factors must be sharply distinguished whenever we are attempting to give the conditions of a particular case of insanity. If I am trying to find out what drove John Smith mad, I must enquire (1) whether any marked tendency to insanity is shown by his family records, whether his brothers and parents and grandparents give evidence of 'good' or 'bad' heredity, and (2) whether his own life has been peaceful or stormy. But it is equally clear that, regarded historically, the two reduce to one: the badly made brain that is inherited by John Smith is due, in the last resort, to the stress laid upon his ancestry. Stress, then, is the general condition of insanity.

Kinds of stress.

The *stresses* that condition insanity are classified by Dr. Mercier as follows:

(1) *Direct Stresses.*—'Blows on the head, inflammation of the brain, the escape of blood into the rigid chamber of the skull, the pressure of a tumour [on the brain tissue], the ploughing-up of the brain-tissue by a clot, change in the composition of the blood [circulating in the brain],' etc.

(2) *Indirect Stresses.*

(*a*) *Internal.*—'Puberty, pregnancy, ulcer of stomach, tuberculosis of lung,' etc.

(*b*) *External.* — 'Adverse circumstances, worries, anxieties, troubles of various kinds.'

§ 116. **The Chief Forms of Insanity.** — No two cases of insanity are precisely alike, just as no two normal minds are precisely alike. Hence any scheme or classification of the typical forms of insanity must be a very rough and approximate affair; it will be useful to the psychologist merely as furnishing a sketch-map of a complicated and little explored region, and to the alienist merely as affording a means of pigeon-holing cases that are more or less similar. Accurate and scientific knowledge of the insane mind can come only by way of the detailed study of individual cases. **Insanity requires detailed study.**

For our present purpose it will suffice to give a 'working' list of the forms of insanity. The reader should be warned that the use of terms differs considerably in different authorities.

I. Insanity as Imperfect Development. **The chief forms of insanity.**

Under this head come the cases which rise, progressively, from weak-mindedness through imbecility to idiocy. The *idiot* must be constantly looked after, as if he were a little child; he cannot learn to adjust himself to his surroundings. "If left by himself he will set himself on fire, or fall into the water, or cut himself, or get entangled in a machine, or come to some actual physical harm which could have been avoided by the exercise of rudimentary intelligence" (Mercier). The *imbecile* can do 'odd jobs,' but is unable to plan or perform continuous work.

II Insanity as Misdirected Development and Degeneration.

Under this head come the typical cases of insanity that are found in asylums: mania, melancholia, dementia, general paresis.

(1) *Mania* is marked by mental exaltation; the maniac is restless, excitable, voluble, enthusiastic. It culminates

in acute delirium. Certain stages are characterised by delusions of grandeur.

(2) *Melancholia* is marked by mental depression; the melancholiac is inert, despondent, incapable of exertion, possessed by the idea of his sorrows. It culminates in stuporous melancholia. Certain stages are characterised by delusions of persecution, etc.

(3) *Dementia* is marked by a mental enfeeblement; the dement is stupid, apathetic, helpless. It may appear as the direct result of stress (primary dementia) or as a consequence of mania or melancholia (terminal dementia).

(4) *General paresis*, or progressive paralytic dementia, begins very much as alcoholic intoxication begins: with impairment of memory, quick changes of mood, exaltation of mind, hesitancy of speech, loss of facial expression. Then come delusions of grandeur, maniacal fits, unruffled self-satisfaction; and, on the motor side, laboured and interrupted speech, scratchy handwriting, staggering gait. Finally, the patient becomes bedridden; he cannot turn himself, and can hardly swallow; mentality seems to cease altogether.—General paresis thus shows a gradual decay of the whole nervous system, from above downwards.

A form of mania that is peculiarly dangerous to the community is *epileptic mania*. The patient is liable to violent maniacal outbursts between the epileptic fits.

The name of *paranoia* or delusional insanity is sometimes used for cases in which there are systematised delusions of grandeur or persecution, but no further impairment of mental function. These cases fall under the general heads of mania and melancholia.

Circular insanity is a form of insanity in which mania alternates with melancholia, with or without the interposition of periods of sanity.

The study of insanity.

Such a list as this is very far from being psychologically satisfactory; it is hardly more than a table of contents, with all the reading to follow. The facts studied in abnormal psychology are matters of detail; the progressive impairment of speech, of handwriting, etc.; the advance of a particular delusion; the gradual fall from a higher mental level to a lower as shown by defects of recognition, memory, judgment, etc.; the phenomena of substitution (the recovery of a lost function by the use of parts of the brain which are normally employed in other directions), and so forth.

Let us take as an example the case of what is called *aphasia*, loss of language. Aphasia may be produced under various conditions, and show itself in various ways. Three principal forms have been distinguished. **Aphasia.**

(1) *Sensory or Amnesic Aphasia.* — The patient can see printed or written words, but cannot understand, *i.e.*, assimilate them; he is in the state of a child, before it has learned to read. He can, however, write from dictation; he can even write out his own ideas: but in neither case does he understand what he has written. This is *word-blindness*.

Or again: the patient can hear words, but cannot understand them; he is in the state of a child, before it has learned to understand what is said in its presence. There is this difference, however: the patient can read, can speak and can write; the only thing that fails him is the assimilation of heard words. This is *word-deafness*.

(2) *Motor or Ataxic Aphasia.* — The patient can understand written or spoken words, but cannot articulate. This is *pure motor aphasia*.

Or again: he can understand, and can articulate; but cannot write what he wishes to write. This is *agraphia*.

(3) *Sensori-motor Aphasia or Paraphasia.* — The patient can understand what he sees and hears, and has the power to write and to articulate, but has 'forgotten how' to use voice and hand. His spoken and written signs, therefore, do not correspond to his ideas. Wishing to say: "Take that light out of my eyes!" he says: "Clean my boots by walking on them!" — and so on.

This classification is by no means complete; Dr. Bateman, in his book "On Aphasia or Loss of Speech," distinguishes no less than fifteen varieties of aphasia. It may be chronic or intermittent; the loss may be loss of substantives, or of proper names or of a few words, or of certain letters; one word may be substituted for another; a particular phrase or series of syllables may be used on all occasions in all meanings; the patient may be unable to name an object unless he can trace the outline of the written word with his finger or foot or tongue; objective speech may be lost, but subjective speech (oaths and interjections: § 88) remain; etc., etc.

It is clear that the detailed study of single cases of aphasia may throw light upon the mechanism of thought and of the association of ideas in the normal mind, — especially if the results of psychopathological observation be compared with those of brain physiology (Flechsig's scheme of the cortical centres).

Questions and Exercises

(1) On waking from a visual dream, keep your eyes closed, and scrutinise the dots and splashes of colour that are sprinkled over the dark field. You will find that they correspond roughly in form and arrangement to the figures of the dream-scene. What does this prove?

(2) Write out a vivid dream, while it is fresh in your memory. Then work it over, and try to account for the sequence of ideas by the law of association.

(3) Watch your dreams for a week, and note whether they are all visual, or whether sounds, etc., occur in them. During the following week, fix your attention steadily, before you go to sleep, upon a certain sound, taste, smell, etc.; and note whether sounds, tastes, smells, etc., occur afterwards among the dream-ideas.

(4) The most general way in which mental derangement shows itself is in 'defective concentration of the attention' (Wundt). Apply this rule to the various forms of insanity described in § 116. Draw diagrams of the typical insane consciousnesses, after the pattern of Figs. 10 and 19.

(5) 'What strikes one most, on going through an asylum for the first time, is the wonderfully little difference, whether in looks or in conduct, that there is between the insane and the sane.' How is this possible?

(6) How do you explain the fact that certain butterflies, spiders, etc., 'sham dead' when taken in the hand? And the similar fact that birds are 'fascinated' by snakes?

(7) What period of life may be said to show a 'normal mania' and what a 'normal dementia'?

(8) What could a psychologist gain from an investigation of the expressive movements of deaf-mutes? (*Cf.* § 88.)

(9) For the most part, 'dreams are easily forgotten.' Yet some dreams are remembered, and remembered for a long time. Under what conditions does this happen?

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CHAPTER XV

The Province and the Relations of Psychology

The various psychologies.

§ 117. **The Scope of Psychology.** — When we stated the problem of psychology, in § 9, we said that it would be impossible to treat of all the questions that confront the psychologist within the limits of a single volume (*cf.* § 115). And the first thirteen Chapters of this book have been confined to one special set of psychological problems: the problems of normal, adult, human, individual psychology. In the last Chapter we have seen that over against normal psychology there stands a psychology of the abnormal mind, the facts of which must be explained in the light of the normal consciousness (*cf.* the explanation of hypnosis), while they, in turn, throw light on certain complicated phases of the normal mental life (*cf.* the facts of aphasia). The same thing holds of the other aspects of the psychology which we have reviewed. Over against adult psychology stand the psychologies of childhood and old age; over against human stands animal psychology; and over against individual stands ethnic psychology (*cf.* §§ 6, 9).

Our own mind the standard of reference.

It must not be supposed, however, that all these branches of psychology are equally independent, or equally far advanced. In the first place, no one of them can be pursued successfully unless the student have a knowledge of the psychology with which this book has mainly dealt. The normal mind of the civilised man is the standard of reference in all psychology. We can explain the minds of children, animals, societies, only by comparing what we know of them with the corresponding facts of the standard mind. This truth cannot be too strongly emphasised: psychological study must begin as the study of the normal adult mind by the method of experimental introspection. To enter upon child study, *e.g.*, without any such preparation, is to set about surveying a plot of ground before one has a unit of measurement.

Scientific psychology

Secondly, we know very much more about the normal adult mind than about the minds of the insane, or of children and animals. This is natural: the only mind that a psychologist can observe directly is his own, a normal adult mind; all other minds must be observed indirectly, and (as has just been said) explained in the light of the standard mind. So it happens that these side departments of psychology have as yet been less thoroughly explored. Abnormal psychology has, undoubtedly, made most progress. Animal psychology is little more, at present, than a method and a string of facts. Child psychology and ethnic psychology consist of observations, newmade or gleaned from history, which are brought with more or less of probability under the accepted laws of biological evolution. 'Scientific' psychology is, therefore, normal adult psychology; the other psychologies promise to be sciences, possess the materials out of which sciences may be formed, but have not so far attained to scientific rank.

The reader will now understand how it is that a work dealing with the normal adult mind can be termed a work on 'psychology,' without qualification. This psychology is *the* psychology, scientific and standard psychology. The other psychologies must be marked off from it by adjectives as 'ethnic,' 'senile,' etc., psychology.

Two branches of child psychology.

§ 118. **Child Psychology.** — The literature of child psychology may be roughly divided into two parts. On the one hand we have records of the mental development of particular children; records which begin with birth, and are continued for months or years. On the other, we have statistical enquiries into the memory, imagination, etc., of school children, taken in classes and arranged in groups according to age and sex. In some cases, the material obtained is turned by the author to *genetic* account: that is, an attempt is made to trace the development of mind, the growing complexity of mental processes, and, perhaps, to parallel it with the fully formed mind of the animal or the savage, or correlate it with the increasing complexity of the bodily functions during the same period of life.

Child records of the first sort seem to begin with the Swiss educator, J. H. Pestalozzi (1746–1827), who kept a journal of the sayings and doings of his son from about the fourth year on. Charles Darwin published in 1877 his "Biographical Sketch of an Infant" (*Mind*, vol. II.), which he had written down in 1840. It contains minute observations of the conduct of one of the writer's sons, and especially of the movements that expressed the child's emotions, from birth up to the middle of the third year. Several similar records have now been published, as well as observations of a more limited character (on the development of children's drawings, the growth of colour-discrimination, etc.).

Child studies of the second kind include enquiries into the contents of a child's mind, *i.e.*, its stock of ideas and beliefs, on entering school; into the mental fatigue brought on by school work; into the child's ability to recognise tones, to estimate and remember the length of lines, etc.; into the instinctive fears of childhood; into the development of language and the appearance of self-consciousness in children; into children's lies; into the range of the childish imagination, etc.

Investigation of fatigue during school hours. Mental fatigue, *e.g.*, has been investigated in five ways. (1) *Arithmetical Method.* The children are required to solve simple arithmetical problems, at the beginning of the morning and at the end of each school hour. The solutions handed in at the different times are compared with regard to quickness and accuracy of work. (2) *Memory Method.* Series of words are read aloud by the teacher, at similar intervals, and written down by the children from memory. (3) *Riddle Method.* Printed pages of simple narrative are prepared, with words and syllables omitted here and there. The children are required to fill out the blank spaces, according to the sense of the narrative. (4) *Method of Cutaneous Space Perception.* The experiment described as no. 6, p. 118, is performed at intervals, and the results of the trials compared. (5) *Ergographic Method.* Finger movements are repeated (and recorded) until muscular exhaustion sets in. Fatigue of the voluntary muscles is thus made an index of mental fatigue.

Two desiderata in child psychology. Some part of this literature has the true scientific flavour; much more of it is useful, as crude psychological material; much, however, is scientifically worthless, owing to the observer's lack of psychological training. Two things are now wanted in child psychology: first, many more detailed studies of individual children, from birth onwards; and, secondly, a thorough study of the child mind from above downwards, — *i.e.*, from the youth of, say, sixteen down to the infant. We do not know at what age introspection becomes possible: but it is certainly possible at sixteen. Working from that age downwards, we should pass through all stages:

from an introspection that is adequate to any mental process, however complex, to an introspection that can cope only with the simpler associations and perceptions; and from this, again, to total lack of introspection, — to the stage at which reliance must be placed upon the observer's interpretation of the movements that express feeling and idea, and no assistance at all can be obtained from the subject.

Something of value for child psychology may be gained, perhaps, from the study of reminiscent autobiographies (J. S. Mill, Tolstoi, Loti) and of artistic interpretations of childhood (Pater, Dickens, Goethe). But it is very difficult, in such cases, to distinguish the *Wahrheit* from the *Dichtung*.

Child and adult psychology.

How far child psychology will be able to repay its debt to standard psychology, — how much a knowledge of it will eventually contribute towards the understanding of the adult mind, — cannot be certainly predicted. But the genetic method has proved fruitful in many departments of scientific enquiry; and as psychology is now a science, and each and every division of it may be approached by scientific methods, we are apparently justified in expecting that the study of the child consciousness will, sooner or later, yield results of high psychological value. Indeed, such a belief is almost forced upon us, when we remember that the child mind is the direct precursor of the adult mind, the one passing into the other in an unbroken continuity of mental experience.

The old animal psychology

§ 119. **Animal Psychology.** — "The question whether or not the animals possess a mind," wrote a philosopher of eminence in the first half of the eighteenth century, "is a question of no particular importance: I shall not dispute it, but leave the reader undisturbed in his own opinion." While the professional psychologists gave small attention to the matter, however, anecdotes of animal intelligence were industriously collected by the laity, — by amateur students of natural history and by the possessors of pet animals. To these collections the modern psychologist has fallen heir; but the inaccuracy of the observations, and the intermingling of fact with popular psychology which characterises them, render the legacy well-nigh valueless.

On the other hand, there is now good hope that animal psychology, learning the lesson of scientific caution from current investigation of the human mind, will gradually raise itself to the dignity of a science. The importance of the study, in view of the general doctrine of evolution, is very great, and many workers have recently been attracted to it. Two results have followed. **and the new**

(1) It is being recognised that animal psychology must be built up from detailed enquiries, not from a survey of the whole field of 'instinct' or 'intelligence'; that the work must be done under the conditions natural to the animal; and that the separate facts must be impartially recorded, without any preconceived theories of their meaning. Thus we have monographs dealing with the actions of single-celled organisms (§ 74), with the behaviour of newly hatched birds and new-born mammals, with the movements that express emotion (p. 16 *sup.*) and impulse in animals, etc. All this is good material. **Modern work**

(2) Along with the change in method of observa- **and modern method.**

tion has come a change in method of interpretation. The actions of animals must be interpreted in the light of human actions, by reference to human psychology; and every action must be interpreted as *simply* as possible. Nothing must be taken as evidence of judgment which can in any way be explained by association of ideas; nothing ascribed to active imagination which can be accounted for by passive. This is a sound method, and has already borne fruit. Among other things, it has given us a more correct appreciation of the phenomena of *instinct* (§ 75) than was possible for the older psychology.

It may seem, at first sight, that the method is unfair; that the animal should have the benefit of the doubt in cases where an action is observed whose motive, in man, might be either judgment-impulse or simple impulse. The supposed unfairness disappears, however, when we look at a test case, like that of articulate speech. If the higher animals, despite their power of articulation, have never developed a spoken language, that must be because they have nothing to say; and if they have nothing to say, their minds are on an altogether lower level than ours. Hence, on the assumption that the animal and the human mind represent different phases of the same course of evolution, it is entirely reasonable to believe that the former 'works' in the simplest possible way. The belief is confirmed, if confirmation is necessary, by the fact (insisted on in Ch. XI.) that men, who *can* think, rarely do so; they take mental short cuts, borrowed associations, whenever they find them to hand. But if we shun mental effort, all the more do the animals avoid it.

Processes of the collective mind.

§ 120. **Ethnic Psychology.** — Ethnic psychology is the psychology of a 'collective' mind, *i.e.*, of the mental processes that are set up by the communion of individual minds; the psychology of a race or society or professional class, as distinguished from the psychology of the individual, child or man. It need hardly be said that the *elementary* processes of the individual and collective minds are the same: the collective mind has no existence apart from the minds of the separate members of the community. But when many individual minds come into contact, new *complex* processes take shape; the elementary processes are put together as they would not have been had mankind lived solitary lives.

The problem of ethnic psychology. The problem of ethnic psychology, then, is to trace the development of these new mental complexes, and to explain them by reference to the conditions of social living. A good deal has been done towards the solution of this problem: scattered discussions will be found in works upon history, anthropology, jurisprudence, philology and æsthetics, as well as in the psychologies. It cannot be said, however, that ethnic psychology exists to-day as a science; there is no special group of books devoted exclusively to it, as there is, *e.g.*, to mental pathology, child psychology and animal psychology.

Ethnic psychology has four main divisions. It has to deal (1) with the growth of *language*. **Language.** We have already spoken of the importance of language to psychology in § 88, which thus anticipates the present Section. It has to deal (2) with the development of *myth*. **Myth.** The primitive myth, the story told of gods made in the image of man, is the germ both of religion and of science. Myth also afforded material for art.

Anthropomorphism of primitive man.

Primitive man looked upon his surroundings from a purely human standpoint; that is, he made men of all the objects around him. If a stone tripped him, it was an enemy that lay in wait for him in the shape of a stone; if a bough struck him, the enemy had taken the form of a tree to surprise him. The gods were simply men of more than human power. Sometimes they were dead chiefs, haunting the places that they frequented during life, and revealing their will in dreams; sometimes they were embodied in the various phenomena of nature, the storm-cloud, the wind, the sun, etc. Only by very slow degrees was the knowledge attained that the course of nature is not capricious but uniform; that there are laws of natural events. And not till this knowledge had been acquired was any separation made between natural science and religion.

The deeds of the gods and of the descendants of the gods, the heroes, were celebrated in poetry and in drama (or rather in a primitive mixture of these two forms of art) at a very early period. At the same time, it is not probable (as we shall see) that art arose out of myth.

Custom.

Ethnic psychology has to deal (3) with the development of *custom*. Primitive custom — the customs of burial and marriage, the ceremonies connected with tillage and harvesting, etc. — is the root of custom proper, of law and of morals. The customs of modern society are partly useful actions (*e.g.*, the eating of meals at fixed hours), partly survivals of older modes of thought and conduct, which persist merely because there is no imperative reason for giving them up (*e.g.*, the wearing of finger rings). Law is custom regulated by the state for the welfare of the majority of its members. Morality is custom regulated by 'public opinion,' by the approval and disapproval of the community. The spheres of law, religion and morals naturally overlap to a considerable extent in all forms of society.

Lastly, (4) ethnic psychology has to deal with the growth of *art*, regarded as the play of the adult (§ 100). Some psychologists regard the æsthetic as a sub-form of the religious sentiment, and would therefore derive art from myth. The question cannot at present be decided; but it seems probable that art is as distinct from myth as myth is from custom. **Art.**

The farther back we go in the history of humanity, the more difficult does it become to separate the products of the collective mind, — to say: this belongs to mythology, this to æsthetics, this to morals, this to custom. The primitive social mind, like the primitive individual mind (§ 48), is a one-tissue mind; differentiation means a relatively high stage of development.

The origin of the æsthetic sentiment. In the case of art the difficulty is unusually great, owing to the variety of purposes which the æsthetic sentiment has been made to serve (courtship, religion, play). It has been suggested that that is beautiful, to primitive man, which he regards as expressing a pleasurable emotion. We must remember that anything (a tree, a weapon) might be thus regarded; for everything was interpreted after the human pattern. The beautiful woman was, then, the woman who expressed pleasure in the man's bodily adornment, the woman in whose face he read the reflection of his own pride; the beautiful landscape was the 'smiling' landscape; the beautiful jar or bow was that in whose look or action the mechanic refound his own self-satisfied pleasure; and so on. The theory is plausible: it is as yet very far from proved.

§ 121. **The Relation of Psychology to Ethics and Logic.** — Ethics is the science of conduct. Its problem is stated by Herbert Spencer in the following words:

"I conceive it to be the business of Moral Science to deduce, The problem of ethics.

from the laws of life and the conditions of existence, what kinds of action necessarily tend to produce happiness, and what kinds to produce unhappiness. Having done this, its deductions are to be recognised as laws of conduct."

Now it is clear that we cannot know 'the laws of life and the conditions of existence' in any other way than by a historical study of human society, by careful observation of the course of human evolution. The laws of life must be generalisations from the facts of life; the conditions of existence must be ascertained from the actual ups and downs of existence at different periods. Or, to put the same thing in another way: rules of conduct can be laid down only after conduct itself, in all its phases and stages, has been described and explained.

Ethics and ethnic psychology.

The necessary preliminary to ethics, then, is the study of society: as Professor Wundt writes, "the straight road to ethics lies through ethnic psychology." Ethnic psychology is the connecting link between the sciences of mind and of morals. On the one hand, its facts must be interpreted in the light of individual psychology (§ 117); on the other, the facts as thus interpreted are the material from which the moralist abstracts those general principles of living whose consequences are to be taken as rules or norms of conduct. Psychology is the foundation of ethics; and not a few old-time ethical controversies are settled, once and for all, by appeal to it.

The province of logic.

Logic is sometimes defined as the 'science of thought.' A better definition would be 'science of the *meaning* or *validity* (soundness, justness, well-groundedness) of thought.'

We have seen that every perception and idea means something. The elementary processes are put together at the bidding of nature (§ 38); and to say that nature lays constraint upon mind is to give the biological account of the fact which the psychologist expresses by saying that mental processes 'mean.' What is 'meaning' in psychology is simply 'formation under stress of natural environment' in biology. Psychology has to do, of course, with all the aspects of mind: the concrete mental processes which form the objects of psychological enquiry are groups-of-elementary-processes-that-mean. Logic, now, abstracts from the processes that compose the perception or idea or judgment, and looks exclusively at the meaning-side of the complex. It does not care whether thought go on in terms of sight or hearing or touch; it is concerned only to discover whether the thought is valid, justified under all sorts and kinds of environmental conditions. It thus proceeds 'formally' or symbolically, like a sort of algebra; and, when it has gone so far as to formulate the laws of valid thinking, deduces from them rules or norms of scientific thought and procedure, — as ethics deduces norms of conduct from the 'laws of life.'

Psychology and logic.

The relation of psychology to logic, then, is twofold. On the one hand, logic arises by way of abstraction from psychology; a single aspect of the total psychological fact is made the basis of a special science. On the other hand, psychological investigation falls under the sway of logic; unless the method of psychology is logical, its results will be invalid.

The problem of pedagogy.

§ 122. **The Relation of Psychology to Pedagogy.** — The problem of pedagogy is to lay down rules or norms of education. Such rules may be derived from two sources: from the history of education and from child study. The history of education shows what rules have been successfully, and what unsuccessfully followed, at different periods and under various conditions; child study should show, in general outline, the relation that the child mind bears to the adult mind, and should therefore assist the adult educator to deal with child pupils.

'Normative' disciplines.

Logic, ethics and pedagogy have, then, this much in common, that all three are *normative* disciplines; their task is to lay down rules, to prescribe norms of action. Logic has made most progress; ethics is still denied the name of science by some authors; pedagogy is only gradually approximating to scientific accuracy.

Child psychology and pedagogy.

Pedagogy is sometimes defined, in round terms, as an 'applied child psychology.' The definition is incomplete, since it makes no reference to the historical study of education. Even when this omission is supplied, however, it is liable to misunderstanding. In the first place, the abstract 'child' of psychology does not exist for education: the teacher has to face, not 'the child,' but real children, Katie Jones and Tommy Smith. Psychology cannot deal with Jones-ness and Smith-ness, but only with child-ness. Science, indeed, can never be 'applied' offhand: inventors tell us that no machine, however careful its theoretical planning may have been, will 'work' upon its first construction; all sorts of unforeseen disturbances occur when the theory is translated into bits of metal. And if this is true of the inorganic world, it is doubly true of the world of mind.

The author of a recent psychological text-book, arguing from the fact that attention is intermittent (§ 36), declares that "in learning anything by heart, we learn best 'by spurts.'" Yet experiment has shown that we learn best by reading the passage through steadily, again and again, from end to end, as if the attention were continuous! So complex are the conditions that determine a particular result, and so difficult is it to travel from theory to application, even within the limits of a single science.

In the second place, the teacher has to deal with a number of children together, with a class. Now the 'abstract' child of psychology is an *individual* child, — just as the abstract adult mind that we have discussed in this book is an individual mind. And it is impossible to pass, at one step, from the individual child of psychology to the class-room child — the 'average' or social child — of pedagogy.

We may, perhaps, say that child psychology stands to education as analytical mechanics stands to carpentering. The more mechanics the carpenter knows, the more intelligently will he work, and the readier will he be when emergencies arise and he is called upon to travel outside of his routine employments. But he has to translate his mechanics into terms of wood (the abstract becomes the real child); and his wood-work is limited by the needs of house building and furnishing (the child must be taught in class). Moreover, he learns in the workshop tricks of his trade (history of education) which on ordinary occasions are of more direct service to him than his theoretical study.

From theory to practice.

We conclude, then, that child study, when it has become a science, when, *i.e.*, it stands as the counterpart of adult psychology, and its conclusions tally throughout with the results of experimental introspection, will constitute one of the two sources from which the teacher may derive his norms of education; and the more gifted the teacher, the greater will be the benefit obtained. The road that leads from theory to practice must always be long and arduous. But those who are seeking to further the cause of education by the way of child study may hold fast to this hope: that just because the road is difficult, and just because the end is reached only by the chosen few, the reformation when it does come will be a reformation worth the accomplishing, a reformation whose effects will more than compensate for the misdirection of energy that marks a period of unschooled enthusiasm.

§ 123. **Conclusion.** — We took it for granted, at the outset, that psychology is a science. "At the end of our enquiry," we said (§ 2), "we shall be able to look back . . . and see that psychology, so far as it has gone, makes up an orderly and systematic body of knowledge." The enquiry is now ended, and the reader must judge whether or not this introductory statement was well founded. So much, at any rate, he will grant: that, if the foregoing Chapters have dealt adequately with mental problems, there is no fact of mind, be it mental process or state of consciousness, that cannot be given its place by the side of other facts, with which it forms a coherent and self-consistent whole, — from which it derives and to which it imparts a significance that could not otherwise be attained.

On the other hand, our enquiry has been brief, and has covered a wide field. While we have indicated that psychology is not "a finished science; that there are yet many problems for the psychologist to solve," we have not been able to enter upon any detailed discussion of controverted issues. The reader must turn for fuller treatment to larger and more comprehensive works: only after an extended study of these will he be able to pass a valid judgment upon the position that psychology holds among the sciences. He will find, no doubt, plenty of 'gossip and wrangle about opinions'; he will regret the time and labour wasted in 'contentions and barking disputations.' But he will find, too, that the foundations of psychology are based upon the solid rock of fact; that, while much remains to be done, much has been accomplished which will never require to be done over again.

A word of caution may be added here. Students of psychology are oftentimes puzzled and discouraged by the differences that they find between what appear to be equally authoritative text-books. One psychologist speaks of the method of experimental introspection; another discusses experiment, with but scant reference to introspection; a third emphasises introspection, while he says but little of experiment. One book makes great use of the logical terms 'discrimination,' 'integration,' 'comparison,' 'generalisation,' etc.; another, as far as possible, avoids them. One author is never tired of insisting on the 'activity' of mind; another will hear nothing of activity. And so on.

Now it must be remembered, in the first place, that doubtful matters are, in the nature of things, more discussed than are matters of fact. If we are all agreed about something, we need spend no words upon it; if we disagree, we must give reasons for our own belief and hear the reasons offered by others for the adoption of a contrary view. Hence, in many cases, there is an appearance of divergent opinion, although the contestants are in complete harmony upon fundamental points. The student must learn to distinguish between surface-differences and differences of principle.

Secondly, no science is finished, complete. Psychologists differ as regards method: so do physiologists. Psychologists fall into two schools, according as they do or do not recognise a mental 'activity': so do physiologists, according as they do or do not account for the phenomena of life in terms of physical and chemical laws. But physiology is a science, whether an individual physiologist be a vivisectionist or an anti-vivisectionist, a 'mechanist' or a 'vitalist.' And psychology may be a science, despite the similar differences of psychological schools. To appreciate a psychological text-book, you must try to think yourself into the standpoint of the writer, to see how he conceived of the task before him, in what guise the separate problems presented themselves for solution. Reading in this spirit you are able (1) to estimate the internal coherence of the writer's system, to decide whether he is self-consistent or self-contradictory, and (2) to judge of its total value as a system, to compare the new method and the new point of view with your own, and decide which of the two is the more fruitful and the more scientific. There are very few books from which something may not be learned; there are none which need confuse you, if you approach them in this way.

Thirdly, however, there is a much more substantial agreement in questions of psychology than appears from the psychological text-books. Psychology has but very recently shaken itself free of philosophy, of metaphysics; and many psychologists still think it necessary to treat of metaphysical and psychological problems together. Thus the difference of opinion with regard to mental activity is a difference of philosophical, not of psychological belief; it is a difference that can never be resolved by psychological methods. When, therefore, you find disagreement among psychologists, you must ask yourself whether the point at issue is psychological or philosophical. If it is philosophical, its discussion is irrelevant, and may be ignored in your appreciation of the psychological work of the writer.

Questions and Exercises

(1) Suppose that, wishing to trace the development of a child's mind, you kept records of its use of *words* and of its progress in *drawing*. What precautions would you take, to have the records clear of error?

(2) Are there, in customs and usages of the present day, any survivals of the anthropomorphic mythology of primitive man?

(3) How can it be that one 'learns by heart' better by reading the passage through, again and again, — *i.e.*, by distributing widely the repetitions of each part of it, — than by committing to memory a few lines or words at a time? Should the readings-through be done all at one sitting, or themselves distributed in time? Why?

(4) Make a Table, in the form of a genealogical tree, showing the interrelation of the various psychologies, and the relation of psychology as a whole to ethics, logic and pedagogy.

(5) Compare (1) the senile with the child mind, (2) the mind of the adult savage with that of the civilised child, and (3) the mind of the adult savage with that of the civilised man. Compare your present answer to (1) with your answer to Question (6), p. 23. Are you now more capable of introspection than you were when you began the book?

(6) What is the original meaning of the phrase 'law of nature'? How has that meaning been modified?

(7) Can psychology ever become a normative science?

(8) What stages can you distinguish in a child's acquisition of language? Does it, *e.g.*, use substantives before it uses verbs, or *vice versa?* What is the psychological importance of a knowledge of these stages?

(9) Explain the following actions in the simplest possible way:

(*a*) "When a small object is thrown on the ground beyond the reach of the elephant, he blows through his trunk on the ground beyond the object, so that the current reflected on all sides may drive the object within his reach."

(*b*) "Hearing a loud knock at the front door, I was told not to heed it, as it was only the kitten asking admittance. I watched for myself, and very soon saw the kitten jump on to the door, hang on by one leg, and put the other fore paw right through the knocker and rap twice."

(*c*) "I knew a large dog that was very fond of grapes, and at night used to slip his collar in order to satisfy his propensity. It was not for some time that the thief was suspected, owing to his returning before daylight and appearing innocently chained up in his kennel."

(*d*) "Some of the old bucks get the berries from the thorn-trees in this way. They will raise themselves on their hind legs, give a spring, entangle their horns in the lower branches of the tree, give them one or two shakes, and then quietly pick the berries up."

(10) What evidence can you bring from language that makes for the theory of the origin of the æsthetic sentiment given in § 120?

(11) What suggestions has psychology to offer towards a hygiene, physical and mental, of school life?

References

James, *Textbook*, pp. 327–329, 367–369, Epilogue.

Sully, *Human Mind*, vol. I., pp. 10–13, 18–22; vol. II., ch. xix., App. G, H, K, L. See also Index, references to 'child,' 'animals,' etc.

Titchener, *Outline*, §§ 5, 6, 99–101.

Wundt, *Ethics*, vol. I.

Wundt, *Lectures*, Lects. XXIII., XXIV., XXVII., XXVIII., XXX.

Wundt, *Outlines*, §§ 2, 19–21, 22–24.

Consult further the works of J. M. Baldwin, E. Barnes (*Studies in Education*, Stanford Univ.), G. S. Hall (*Pedagogical Seminary* and *Amer. Journ. of Psych.*), G. Le Bon, T. W. Mills, K. C. Moore (*Psych. Rev.*, Supplement), C. L. Morgan, B. Perez, W. Preyer, G. J. Romanes, M. W. Shinn (Univ. of California *Studies*), D. Spalding (*Macmillan's Mag.*, 1873), J. Sully, F. Tracy, E. Thorndike (*Psych. Rev.*, Supplement).

Consult also various articles in *Amer. Jour. of Psych.*, *Mind*, *Philosophische Studien*, *Psych. Review*, and *Zeitschrift f. Physiologie u. Psychologie d. Sinnesorgane.*

APPENDIX I

APPARATUS AND MATERIALS

[Pieces of apparatus not expressly mentioned in the *Questions and Exercises* are printed here in square brackets.]

The teacher will do well to procure in addition the catalogues of the following firms:

A. Appunn, 12 Nürnbergerstrasse, Hanau a. M. (Acoustic instr.)
Cambridge Instrument Co., St. Tibb's Row, Cambridge, England. (General.)
R. Jung, Heidelberg. (Optical instr.)
R. Koenig, 27 Quai d'Anjou, Paris. (Acoustic instr.)
W. Petzold, 13 Bayersche Strasse, Leipzig. (General.)
C. Verdin, 7 Rue Linné, Paris. (General.)

[1] Instruments of the 1899 model have the side-wire provided with a clip to hold the screen, while bar *b* (p. 183) carries a projecting arm with clip to hold the stimulus cards.

APPENDIX II

THE CORTICAL CENTRES (FLECHSIG'S SCHEME)

Figures 20, 21 are drawn, on a reduced scale, from a lithographed plate in Flechsig's *Gehirn und Seele*, 2d ed.,

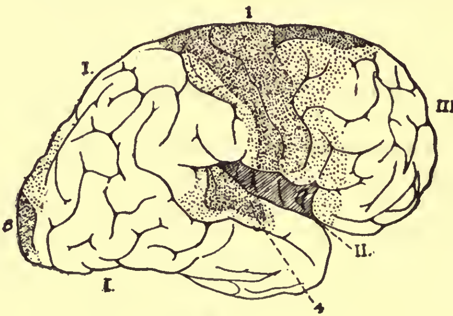

Fig. 20

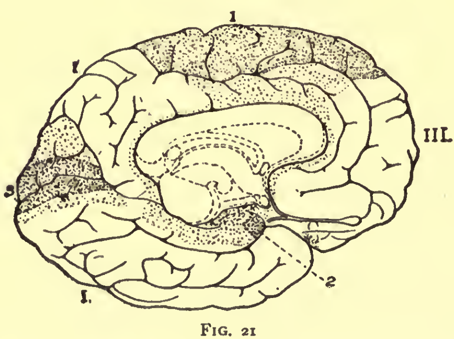

Fig. 21

1896. Fig. 20 shows the outer surface of the right, Fig. 21 the inner surface of the left, cerebral hemisphere. For the topography of the cortex, see *F.*, p. 767.

The Arabic numerals denote the *sense-centres*. 1 is the centre for 'bodily feeling' (touch and organic sensations); 2, that for smell; 3, that for sight; and 4, that for hearing.

The smell centre is structurally the simplest (*cf.* p. 47, *sup.*); then follow in order the centres for 'bodily feeling,' hearing and sight (*cf.* pp. 38, 42). The centre for 'bodily feeling' is the largest of all, and has far more numerous motor connections than all the rest together; its high development is characteristic of the human brain. For one phase of its psychological importance, see p. 225.—It is interesting to note that in some of the mammalian orders the smell centre is the largest, while in certain catarrhine monkeys the sight centre is enormously developed.

The *taste* centre has not been finally localised. It probably occupies the anterior half of the *gyrus fornicatus*.

The Roman numerals denote the *association-centres*. I. is the great posterior association-centre, bounded by the sense-centres of touch, sight and hearing; II., the middle association-centre, occupying the *Insula Reilii*, and bounded by touch, hearing and smell; and III., the anterior association-centre, bounded by touch and smell (and taste?). The relatively high development of this third association-centre, and the surpassing of the sense-centres by the association-centres in extent, are characteristic of the human brain. The structure of all the association-centres is uniform.

What of the interconnections of these centres? Cross connections (from hemisphere to hemisphere) obtain between the corresponding sense-centres of each hemisphere, and between the two posterior and anterior association-centres. The two insulæ, however, are relatively separate; their importance is only local. Direct connections within the same hemisphere obtain between the touch and smell centres; but the sight-centre is very sparsely connected, whether with the touch or with the hearing centre. The anterior and posterior association-centres, also, show very little trace of direct interconnection. On the other hand, the sense-centres are indirectly connected by way of the association-centres; and the two great association-centres are held together by the centre for 'bodily feeling,'—which again, therefore, evinces its supreme importance for the centralisation of consciousness. Lastly, it should be mentioned that every sense-centre is also a motor-centre; the motor connections of the association-centres are only indirect.

Other articles by Professor Flechsig will be found in the *Bericht über den 3ten internat. Congress für Psychologie*, 1897, pp. 49 ff.; and in the *Neurolog. Centralblatt*, November, 1898. In the latter paper, Flechsig recognises three (not two) levels of cortical centres. Besides the sense-centres and the association-centres there are the *intermediate* centres, composed of the lightly-dotted portions of the sense-areas of Figs. 20, 21, and of the adjoining marginal areas of the association-centres. These intermediate centres stand midway in order of development, and presumably in function, between the sense-centres and the association-centres proper.

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OF

NAMES AND SUBJECTS